This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

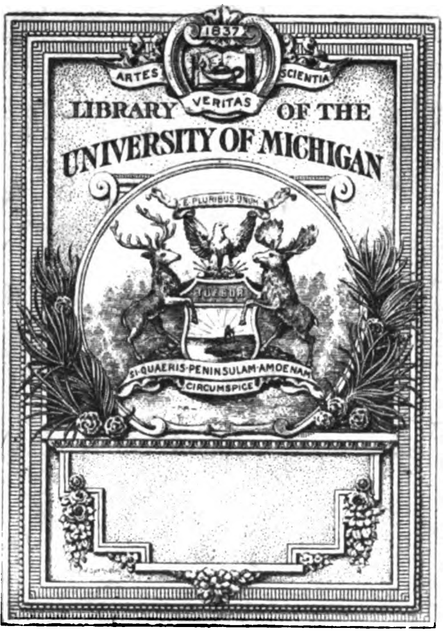
+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`



1837
ARTES VERITAS SCIENTIA
LIBRARY OF THE
UNIVERSITY OF MICHIGAN
E PLURIBUS UNUM
TUEBOR
SI·QUAERIS·PENINSULAM·AMOENAM
CIRCUMSPICE

610.5
D56

THE
Dietetic and Hygienic Gazette
A MONTHLY JOURNAL OF PHYSIOLOGICAL MEDICINE

VOL. XII. NEW YORK, JANUARY, 1896. No. 1

COMBUSTION PROCESSES IN THE HUMAN SYSTEM.*

THE ADVANTAGES OF OXIDATION.

By A. Symons Eccles, M.B. Aberd.

The first fact—or, so to speak, letter—of the physiological alphabet which it appears to me we should bear in mind while discussing the advantages of oxidation in regard to the human body, in health and disease, is this, that whereas plants by a reduction process build up simple bodies of small molecular value and stable composition into complex combinations of high molecular value and unstable constitution, animals, on the other hand (the human body, for instance), by oxidation break up the complex combinations of atoms formed by plants into bodies of much simpler constitution and of greater stability, and in this combustion process heat, work, and other forms of energy are evolved. The second letter of our physiological A B C to which I would draw your attention is that the end products of these oxidation processes are carbon dioxide and water, the result of non-azotized substances, and urea, which may again be decomposed into carbon dioxide and ammonia, the result of azotized matters or proteids. May I venture to suggest that most of the work done in the human body is performed, so far as we are yet aware, by the combustion of the carbohydrates, while the wear and tear of the organism itself are represented by the nitrogenous waste matters, the end product of complete combustion being urea? It may be that this suggestion will not hold good, but that, to continue my simile, I am attempting to construct from our physiological alphabet a word which is misspelt and does not exist as a physiological truth; but on reference to Professor Michael Foster's work I find that my notion, at any rate in regard to muscular work, is not so far-fetched as it might appear to be, for he compares the special contractile carbon-hydrogen substance of a muscular contraction to the charge of a gun, the products of its combustion being carbonic and sarcolactic acids, while the real living material of the fibre may be compared to the gun itself, which, however, is constantly undergoing change in excess, according to Foster, of mere wear and tear.

Since a large proportion of the oxidation processes carried on in the human body occurs in the muscular system, it may not be unprofitable to note briefly the present state of our knowledge in regard to the series of chemical events taking place in an active muscle. We find that the products of incomplete oxidation of both nitrogenous and non-nitrogenous matters are always in excess, while, except in cases of severe and almost unique over-fatigue, the formation of urea—*i.e.*, of completely oxidized proteid matter—is not increased. It is to the accumulation of partially oxidized waste products within the muscle that we must attribute the fatigue, and that impotence to continue work after a certain time which supervenes

---

* An address delivered before the West London Medico-Chirurgical Society and published in the *Lancet*.

259513

on muscular exercise. It appears that the quantity of nitrogenous material oxidized is the same in an active and passive muscle, but during contraction such a quantity of oxygen is used up in the combustion of the hydrocarbons that insufficient oxygen remains for the complete oxidation of the nitrogenous matter; so, instead of urea, we have other substances resulting from muscle waste—default of oxygen leading to incomplete combustion and the consequent formation of uric acid and creatinine, substances which may be regarded as the insufficiently oxidized precursors of urea. But this incomplete oxidation is also shared by the hydrocarbons, for, although we find seven times the amount of carbon dioxide formed in an active muscle over and above the amount produced in the passive organ, there are certain products of incomplete combustion derived from hydrocarbons rendering the reaction of the fatigued muscle acid instead of alkaline. The most constant of these non-nitrogenous fatigue products is sarcolactic acid, and it is probably to the accumulation in the system of both this and the incompletely oxidized nitrogenous products of muscular activity that we may attribute the aching weariness of over-fatigue experienced by persons unaccustomed to exercise. It must be remembered, however, that, although evidences of excessive acidity and of leucomaines may be found after over-exercise in the urine of persons habitually sedentary, no such phenomena present themselves in the urine of individuals who are in training. In other words, it is possible to improve the processes of intra-organic oxidation and to render them more complete by means of a course of regular and systematized exercise, which will induce increased amplitude of respirations, augment the volume of blood passing through the muscular system, and favor the combustion of fatty tissue.

THE SIGNIFICANCE OF LEUCOMAINES IN THE URINE.

But oxidation does not only take place in the muscles, for we know that it occurs in the blood itself, in the glandular structures, and, as Ehrlich has shown, in the cells of all the tissues, especially in those of the brain, liver, and heart, where processes of oxidation and reduction are constantly going on.* I cannot hope to add much to the knowledge already placed at our disposal by Gautier,† who first gave the name leucomaine to alkaloids appearing during life in the tissues of animals. His researches, with those of Brieger, Bouchard, Liebreich, and Pouchet on the Continent, and of Thudichum in our own country, have resulted in the isolation of these toxic substances in healthy and morbid urine. It has been shown that they are physiologically produced in our bodies and eliminated by the bowels, kidneys, skin, and lungs. They exist in the blood, where they accumulate if for any reason they are not got rid of, and under these circumstances we suffer from the effects of auto-intoxication; but there are two distinct methods by which nature provides that we should not poison ourselves with our own venom—viz., the elimination of these toxines by the organs of excretion and their destruction by oxygen. Of these two methods the most important is the process of oxidation, for most of these leucomaines are very readily oxidized, and as Gautier has shown, it is by the constant renewal of oxygen that they are burned up and made to disappear, such of them as are not destroyed by combustion being more readily and easily eliminated after oxidation. Under normal conditions only a very small proportion of leucomaines is found in the urine; but if anything should interfere with the due oxygenation of the blood, or if the oxygen therein contained should be used up for the oxidation of other materials, then we find that there is a remarkable increase of leucomaines in the urine; pointing to an excess of these toxines in the blood, so that it would not be far wrong to describe the morbid condition of some patients as "leucomainæmia." In 1882 Bouchard demonstrated the presence of animal alkaloids in healthy urine and that they were greatly in excess in cases of infectious fevers, particularly in typhoid fever; while Pouchet observed them in the urine in certain cerebral maladies without fever. It is, however, in the class of disease so admirably described by Bouchard as "*maladies per ralentissement de nutrition*"—*e.g.*, anæmia, chlorosis, gout, glycosuria, neurasthenia, and uricacidæmia—that we find the clearest evidence of insufficient activity in the oxidation processes, with excess in the urine of the products of incomplete oxidation. Speaking for myself, I would venture to assert that many phenomena of functional nervous disorders are primarily due to this deficiency of oxidation; that, as a consequence of this insufficient combustion, toxic substances accumulate in the blood and give rise to the train of symptoms—dyspeptic, myelasthenic, encephalasthenic, and emotional—which we classify or generalize under the term neurasthenia.* Whether these toxic matters are alkaloids or not, they appear to be capable of producing more or less profound disturbance in the functions of nutrition; and it may be that these extractives, nitrogenous and incompletely oxidized, exist side by side, as Gautier has suggested, with alkaloids which have been isolated and crystallized.

---

* Brunton: Croonian Lectures, 1889, p. 96.

† Ptomaines and Leucomaines. Paris, 1886.

TABLE I.—*Showing Daily Amount (in grams) of Leucomaines and Urea passed during Twenty-four Hours for Ten Days by Four Healthy Persons Unaccustomed to Exercise on Ordinary Diet.*

First ten days without exercise.		Second ten days with exercise.		First ten days withou exercise.		Second ten days with exercise.		First ten days without exercise.		Second ten days with. exercise.		First ten days without exercise.		Second ten days with exercise.	
Leucomaines.	Urea.	Leucomaines.	Urea.	Leucomaines	Urea.	Leucomaines.	Urea.	Leucomaines.	Urea.	Leucomaines.	Urea.	Leucomaines.	Urea.	Leucomaines.	Urea.
7.5	38	10	32	9	40	10	36	8.4	36	9 5	36	7.2	35	9.9	36
9.3	33	13	33	8	36	10	36	7 5	33	10.8	38	6.9	35	9.2	38
9.0	33	10.5	32	7	35	10	35	7.9	35	10.2	38	7.5	38	9.5	35
10.3	32	11.3	33	9	38	10	33	8.2	38	10.0	35	7.9	36	9.0	37
9.75	36	12.2	32	9	38	9	38	7.8	32	9.9	38	9.0	36	9.2	33
6.5	32	11.8	34	10	33	10	35	9.5	33	9.5	38	8.5	35	8.9	35
7.8	37	11.5	32	7	35	10	33	9.2	33	10.0	33	7.9	35	9.2	35
9.2	38	12.2	35	7	38	10	32	8.5	35	10.0	35	8.2	38	8 4	38
9.0	35	11.5	33	7	38	11	36	7.5	32	11.2	36	7.4	32	9.7	35
10.3	33	11.0	31	9	35	10	36	7.2	35	10.0	35	7.4	35	9.2	35

THE DETECTION OF LEUCOMAINES.

The method employed for the detection of leucomaines in the urine is that which is described by Professor Alexander von Poehl, of St. Petersburg, in his communication on Oct. 10, 1892, to the Academy of Sciences of Paris on the Rôle of Spermine in Intra-organic Oxidations, and is set down by him as follows: "To 100 c.c. of urine are added 25 c.c. of hydrochloric acid, HCl (sp. gr. = 1124), and 10 c.c. of a decinormal solution of phosphotungstic acid. The precipitate is composed of leucomaines as phosphotungstates." Von Poehl goes on to say that he estimated the nitrogen of this precipitate by the method of Kjeldahl, and in cases in which albumin or peptone was present these substances were eliminated by precipitating them with phosphotungstic acid in the presence of acetic acid. In examining urine for the presence of leucomaines I have closely followed the directions given by Von Poehl as above, save in regard to the Kjeldahl process for the estimation of nitrogen, which is of too complicated a character for ordinary clinical use. In every case the whole of the urine passed during twenty-four hours available for testing purposes has been collected, and from the mixed urine so obtained the necessary quantity for examination has been taken. (See Tables I. and II.) In some cases several observations have been made on the urine passed in the same twenty-four hours, and the morning and evening urines in a few cases have been separately tested.

Each specimen has been tested for albumin by the heat and nitric acid test, and in some cases after filtration by the acetic acid and ferrocyanide of potassium test. Similarly in every case the biuret test for pep-

---

* See also Herter on Intestinal Putrefaction in Certain Neuroses, *New York Medical Journal*, Jan. 27, 1894; Macpherson on Disinfection in Acute Insanity, *Journal of Mental Science*, January, 1893; and Uric Acid in Causation of Disease, by A. Haig. (London: J. & A. Churchill, 1894.)

TABLE II.—*Showing Daily Amount for Thirty Days, in Grams, of Leucomaines and Urea passed in the Urine of an Anæmic Person treated by Rest, Massage, and Exercises.*

Leucomaines.	Urea.	Leucomaines.	Urea.	Leucomaines.	Urea.
6.5	33	7.5	36	7.9	38
6.2	33	7.2	38	8.2	38
6.5	29	9.2	38	10.2	36
6.5	32	8.5	35	10.0	36
7.0*	33*	7.0	33	8.5	36
8.2	35	7.2†	33	8.5	35
7.5	35	9.5	38	9.2	35
9.2	35	10.0	36	9.5	35
7.5	36	10.2	38	9.0	35
7.2	33	9.2	38	7.5	36‡

* On fifth day massage commenced.

† On sixteenth day active exercises added.

‡ From thirtieth day onwards the average of leucomaines passed was 7.5 grams, and of urea 35 grams.

tones has been employed. Albumin has not been detected in the urine in any of the cases here recorded; in those in which the presence of peptone was indicated by the biuret test the urine has been filtered after the peptone was precipitated by the phosphotungstic acid in the presence of acetic acid, and the filtrate so obtained has been treated with hydrochloric and phosphotungstic acids in the proportions indicated by Von Poehl. In estimating the quantity of the precipitate of phosphotungstates each filter paper has been separately weighed before use, and from the total weight of the dried precipitate and filter paper after filtration the weight of the filter paper has been subtracted. The filter papers employed were those usually regarded as chemically pure, and the weights were taken by means of Becker's balance sensible to ½ milligramme. Every precaution was taken to avoid error in carrying out the tests as far as they go, but I am aware that they are open to objection on the score of accuracy in the description of the precipitate. It is maintained by scientific chemists whom I have consulted in the matter that substances other than leucomaines and ptomaines are precipitated from urine by the reagents employed in the proportions cited, and one of my friends has been good enough to perform control experiments with Hofmeister's and other tests for animal alkaloids given by Von Jaksch in his work on "Clinical Diagnosis."* In trying several of these reactions it was found that the results differed materially, and it appears therefrom that the excessively complicated nature of some of the bodies present in healthy urine, and still more so in urine under pathological conditions, renders it well-nigh impossible to be sure as to what one is doing. Under these circumstances lengthy investigation would be necessary to show where the differences lie, and the work would be very complicated. Attempts have been made to eliminate the source of possible error, but without any marked success. Von Poehl, however, is my authority for the methods employed, and to use his own words, "*le précipité se compose de leucomaines à l'état de phosphotungstates.*" The urea has been estimated by the ureameter of Southall, and it is interesting to note that in comparing the relation between the weight of the phosphotungstate precipitate and that of the urea as estimated for the same twenty-four hours it will generally and almost invariably be found that they are in inverse ratio. When the proportion of the precipitate is high the estimated quantity of urea is low, and *vice versa.* The exceptions to this have been so rare that they may be regarded as unimportant.

In regard to Table III., it must be borne in mind that the amount of urea has been computed from the volume of nitrogen gas evolved. But this nitrogen may represent urea *plus* other nitrogenous urinary constituents, normal and abnormal; therefore, if my experiments are correct, the presence of leucomaines appears to interfere with the elimination of azotized waste product, for even when the phosphotungstate precipitate is heavy the volume of nitrogen does not seem to increase proportionately. While, then, I do not desire to lay great stress upon the comparative quantity of the leucomaine precipitate on the one hand, and that of urea computed by the hypobromite test on the other, as the conclusions drawn therefrom may be based on error, there still remains the clinical fact that when Von Poehl's test shows a heavy deposit certain conditions of disturbed function appear to be associated therewith, and it would appear that these functional derangements may be regarded as symptoms of retention poisoning. That uric acid is not the only factor in the production of the symptoms which I believe to be due to the presence of incompletely oxidized bodies in the system is shown by the fact that in many cases there is distinctly low tension.

---

* Von Jaksch; Klinische Diagnostik, p. 126.

THE ELIMINATION OF TOXINES BY THE URINE.

Now in every case of healthy urine the amount of the precipitate (which for the purpose of this address I shall assume to be correctly deemed to be composed of leucomaines or of these alkaloids *plus* other products of nitrogenous waste incompletely oxidized) is very small compared with the quantity thrown down from morbid urine. Again, the amount of urea, although it varies somewhat in health and disease, is usually greater in the former case. In a case of melancholia or profound depression, in which an attack of influenza for the time being was attended by complete remission of all the mental symptoms, the patient during the period of pyrexia losing all despondency, dread, and insomnia, it was most remarkable to see the fluctuation in the amount of leucomaines before, during, and after the pyrexial attack. During the first four days of the disease the temperature rose from 97.8° to 102.5° F., with an intermission of one degree on the evening of the third day. From this point it gradually declined, reaching the normal on the ninth day and never again rising, though occasionally subnormal. The quantity of urea excreted was 26 grams on the first day. From this point the quantity rose considerably with the temperature, reaching 40 grams on the fifth day, and declining thence to 33 on the twelfth day, between which point and 35 grams it remained. The quantity of leucomaines was 17 grams at the beginning; by the third day it had risen to 21, whence it declined steadily to 13. During the following twelve days it remained at this point or below, save that on two occasions it rose to 15 and on one dropped to 10. On the seventeenth day it suddenly fell to 9.3. Those who are familiar with cases of nervous depression often meet with those of intermittent melancholia in which sometimes with regularity, at others irregularly, the patient presents all the features of most profound depression and mental morbidity, with abject inability to believe that there is any hope of betterment or of avoiding catastrophe on one day, and shortly after, without apparent cause, the demon of misery, irritability, and dejection is supplanted by cheerful freedom from all mental depression and physical malaise. How are we to account for these hitherto inexplicable variations in the subjective symptoms of one and the same individual occurring within a few hours? I believe that the explanation will be found in the ebb and flow of the tide of toxines manufactured and accumulated in the system. The habits of these persons are often sedentary, or tend to become so under the influence of the weird sensations in the head, the vague disorders of the digestion, and the semi-incoördination of the limbs from which they suffer. On examining the urine in such cases, before I was acquainted with Von Poehl's test for leucomaines, I often noticed the presence of oxalates and urates in excess and the small excretion of urea, in one instance the amount per diem of this last substance falling as low as 24 grams. Since I have employed Von Poehl's method only two opportunities have arisen for noting the incidence of leucomaines in persons suffering from paroxysmal neurasthenia. In both cases the attacks of mental and physical exhaustion have come on without any cause assignable by the patients. In each case vertical and occipital headache, insomnia, mental agitation, hopelessness, and emotionalism have been attended by extreme physical languor and general aching weariness in the back and limbs. Both occurred in otherwise healthy men leading active lives, and certainly in one there was no psychical or physical cause for the sudden supervention of neurasthenia. In the other, possibly overwork of a sedentary nature may be regarded as a determining factor. Now on examining the urine on each occasion of recurrence of the nervous symptoms a heavy precipitate of leucomaines was observed. At the commencement of treatment by vigorous massage, rest, a light nutritious diet, and mild saline aperients the amount of leucomaines excreted at first increased, but in the first week there was a decrease in the precipitate, which gradually fell in the course of three weeks in one case, and five in the other, to a small quantity, no greater than has been observed in health, while the urea excretion increased. *Pari passu* with these changes in the urinary conditions the nervous symptoms of these patients improved and the attack passed off. Now it may be quite fairly alleged that since in the one case complete remission had occurred without any treatment on more than one occasion credit is not to be too readily given to the means employed for the oxidation and elimination of the toxines; yet in face of the evidence in the other case which I shall lay before you, I think that incomplete oxidation of toxines having been recognized during the attack, which passed off with a diminution of their appearance in the urine, it may be conceded in the light of the future history of this patient that the advantages of oxidation were fully established in his case. This patient, who had been almost entirely incapacitated for his usual occupation during five years by reason of constant breakdown, mental and physical, has kept himself in good health by following my *régime* in regard to exercise. Before he came under observation he had led a very sedentary life, never taking any exercise worth speaking of. During the last two years he has been free from his old enemy, only rarely consulting me—I think thrice only—for slight occipital headache. This happy issue out of his affliction I attribute to the fact that he is constantly employing his leisure in doing those things which are requisite and necessary as well for the body as the soul. He plays lawn-tennis, fences, sculls, and rides according to the season of the year, and has lately developed a very pretty taste for golf. In other words, he is fostering the processes of oxidation initiated by massage and kept up by healthy, vigorous exercise.

THE ADVANTAGES OF OXIDATION IN AUTO-INTOXICATION.

It would be easy for me to multiply instances from my case-book illustrating the advantages of oxidation in cases of anæmia, glycosuria alternating with uricacidæmia, and other maladies, which are obviously conditions associated with incomplete oxidation, in which the promotion of the oxidation processes by the employment of massage, athletic and mechanical exercises, and the use of red bone-marrow or injections of spermine, has been attended by the happiest results; but time will not permit, and I will only cite one case which has recently come under my notice fully bearing out the advantages of oxidation in auto-intoxication. A very vigorous, robust friend, who is one of the most athletic of muscular Christians I have ever met, was prevented by an accident from carrying out his usual round of healthy exercise. He straightway fell into a melancholy, peevish condition and consulted me. We devised means for repairing the damaged ankle and I bade him resume his accustomed pastime. While awaiting the opening of the shooting season he accepted an invitation to a country house which for some reason fell through, and my patient, disappointed of his lawn-tennis, became more irritable and felt himself much aggrieved. In his urine I had found ample evidence of deficient oxidation, and suggested various exercises possible in town, of which he would have none; but one morning he arrived in my consulting-room radiant and glowing with good health and spirits, when I found he had taken a leaf out of Mr. Toole's book in the play of "The Upper Crust." You will perhaps remember that the gentleman of sudden fortune whose part is played by Mr. Toole, after being annoyed by the snubs of his aristocratic guests, sticks his thumbs into his armholes and truculently announces, "That rascal Grubbins didn't touch 'is 'at to me this mornin'; I'll go and give 'im something." My friend in much the same frame of mind, having received an annoying letter among his morning correspondence, went forth and hired a pugilist for a twenty minutes' "mill," whence he came back to me announcing where he had been. All the irritability and despondency had been worked off in self-defence, and due oxidation had been re-established. The next day there were only traces of leucomaines in the urine. (See Table III.)

TABLE III.—*Effect of Pugilistic Exercise on a Healthy Person Temporarily Sedentary.*

Amt. of Urine.	Leucomaines.	Urea.	Condition.
	Grams.	Grams.	
1600 c.c.	4.5	38	Headache owing to lack of usual exercise; irritable.
1525 c.c.	5.9	42	
1500 c.c.	4.5	39	
1480 c.c.	6.9	35	
1500 c.c.	7.2	33	
1275 c.c.	6.9	33	Exercise.
1625 c.c.	13.2	35	Cheerful.
1550 c.c.	10.0	38	Quite well.

THE RELATION OF PYREXIA TO TOXÆMIA.

Gentlemen, at the outset I warned you that my remarks would assume a suggestive, not a constructive character. Now what I am going to say will be speculative rather than suggestive, so that it may fairly be regarded as unpractical and therefore valueless; but we who are not always able to verify our opinions, and who carry out the work of our lives and base most of our practice on what, after all, is only opinion, know that, however valuable scientific certainty must be, there are times when unconscious knowledge, medical instinct, intuition—call it what you will—comes to our aid and guides us to a correct decision, why and wherefore we are never able to formulate. This confession of a fact, which we all recognize even if we will not acknowledge it, must be my excuse for the following speculations. Granted that there is a great family likeness between the toxines due to physiological processes and those of bacterial origin, that both may be anaerobic and by oxidation will be rendered easier of elimination, does it not seem probable that in most cases, if not in all, the presence of pyrexia denotes the existence of toxæmia, and fever is only a vigorous and sometimes over-energetic method of nature to oxidize these matters and so get rid of them either by burning them up or by making them ready for excretion? Under these circumstances high temperatures, so long as they are not hyperpyrexial, may not be altogether without beneficence. If I do not weary you, let us note for a moment the parallelism between the prodromatous symptoms of the acute fevers and the usual concomitants of chronic functional nervous disorders. In both we find general malaise, rachialgia, prostration, nervous and muscular, disordered digestion, headache, derangements of sleep, and mental disturbance. Nor does the similarity end here, for in not a few instances of so-called nervous maladies we meet with pyrexia, as in the hysterical hyperpyrexia known to us all. May not the fevers of over-fatigue, of hysteria, and of zymotic disease proceed from one and the same cause? Not, indeed, of common origin, for in the one set of cases we are dealing with auto-intoxication without the intervention of bacterial agencies; in the other the infection is introduced from outside. How often we see the temperature of little children running up to a great height as the result of some transient disorder of digestion and subsiding equally rapidly under the administration of a little dose of calomel, at once an intestinal disinfectant and an eliminant. Is not the hyperpyrexia in these cases an effort of nature to oxidize, and thus aid in the elimination of leucomaines or ptomaines absorbed from the gastro-intestinal tract? There is, however, another small point in reference to disturbance of digestive function to which I should like to allude before passing on to the brief consideration of other conditions pointing to the importance of oxidation. In cases of chronic disease depending on, or associated with, deficient oxygenation, we find dyspeptic symptoms markedly present, and of these one of the most frequent causes is butyric fermentation. Now, as you are aware, while lactic fermentation is ærobic and normal, when not excessive, butyric fermentation is always abnormal and anærobic. This condition is very common among anæmic persons and those suffering from wasting maladies; sometimes, also, I believe, it is not uncommonly present in pneumonia. Under such circumstances the administration of the so-called ozonized water, which is really a solution of hydrogen dioxide, proves valuable in checking the fermentation process. I have not myself had opportunities of testing the value of what our French neighbors manufacture and describe as "*l'eau oxygénée*" in acute maladies; but in the digestive troubles of anæmic, chlorotic, and obese subjects I have found this preparation exceedingly useful; indeed, I am not at all sure that I have not seen benefit arise from the simple practice of swallowing air, although under ordinary conditions of flatulent dyspepsia, due rather to lactic than to butyric acidity, we all know how greatly the discomforts of recumbent patients are increased if we do not teach them to take liquid nourishment without swallowing quantities of air. May not the introduction of oxygen into the stomach prove useful in arresting the suffering which anærobic fermentations set up, greatly adding to the already heavy burden which the patient with pneumonia has to bear? This gastric complication in acute maladies and its local treatment may be a comparatively trivial matter regarded in the light of the more serious and dangerous conditions arising out of deficient oxidation; yet, since we are not only engaged in the endeavor to save life and arrest disease, but also to assuage suffering and relieve pain, it may not be altogether beneath your notice.

ANÆMIA DUE TO AUTO-INTOXICATION.

I suppose there are few who would object to the general statement that all anæmic patients are constipated; but is it not equally true that most sufferers from constipation are anæmic or present signs of deficient oxidation? Every day clinical observations appear to point to the existence of more or less coprostasis as the cause of the bloodless condition. Compare the headache, foul tongue, depression, and irritability produced by a large dose of quinine with the similar conditions accompanying constipation and the absorption of toxines arising therefrom. Ehrlich's observations on the effects of quinine upon living cells have shown how these are deprived of their oxygen and reduced from a state of amœbic activity to an inert mass of almost spherical protoplasm. Now it has been shown that leucomaines and ptomaines are very readily oxidizable, or, in other words, that they are also like quinine, powerful reducing agents, and if we remember that oxidation and reduction processes are constantly alternating within the cells it is easy to understand how readily this rhythm may be upset by the presence in the blood of these poisons. On this point it would be interesting to obtain further information as to the relationship which I believe exists between the presence in the blood of toxic substances and the pale, almost waxy appearances associated with long-continued habitual constipation. We know that the large intestine takes a great share in the work of absorption. After the richer elements of the food have been elaborated, prepared, and absorbed by the stomach and small intestine, in the splendid economy of nature that which remains is so dealt with that we may regard the colon as the "chiffonnier," the mass of material finding its way into this last receptacle being, as it were, carefully picked over, slowly and laboriously turned and stirred, until nothing that can be utilized for the purposes of nutrition is suffered to escape. When this purpose, however, takes too long in doing the chemical processes assume a putrefactive nature, and thus follows the introduction of poisonous in place of nutritive material. Now one feature in the character of ptomaines and leucomaines is their greed for oxygen. They are among the most easily oxidizable nitrogenous bodies, so when they reach the blood, either by absorption from the intestines or as the result of tissue-waste, it is not difficult to explain the anæmia, blood starvation, and deficiency of oxygen which we recognize as salient symptoms in the condition of so many who consult us. The same struggle for life which has been so brilliantly described by the Russian scientist as existing between phagocyte and microbe would appear to occur chemically rather than physically between the invading horde of leucomaines and the army of peaceful red corpuscles engaged in the labor of obtaining, conveying, and giving up the oxygen necessary for the life of the tissues. How often do we not see the history of communities simulated —nay, almost repeated—in the physiological story of our own bodies? The unstable, half-starved, ill-conditioned nomad sweeps down from his mountain fastnesses upon the hard-working, somewhat sleek, and certainly unwarlike pastoral population of the plains. So it is with these conditions of deficient oxidation; not only do we find bodies formed which are in themselves evidences of oxygen poverty, but when formed and absorbed from without they not only seize upon the surplusage but deprive the blood and tissue cells of their fair share of oxygen. In examining the blood of persons suffering from constipation who have also exhibited anæmic and neurasthenic symptoms the corpuscular value is not often found to be decreased, but the proportion of hæmoglobin is usually below the normal in all such cases, so that in conditions of bloodlessness due to auto-intoxication we do not find at first a diminution in the numbers employed for conveying oxygen to the tissues, but a deficiency in their load; thus the anæmia is qualitative rather than quantitative. Under these circumstances elimination alone will not suffice to restore the health of the patient, but means must be taken to promote also oxidation processes in themselves favorable to the destruction or evacuation of the offending matter.

It is interesting to note in connection with the processes of oxidation the swing of the therapeutic pendulum of the day. We have our attention on the one hand constantly drawn to the virtues of numerous antipyretics of coal-tar origin, all of which owe their action to their reducing qualities, while on the other hand we are beginning to recognize the value of animal extracts, the majority being remarkable for their potency as oxidizing agents. I cannot help thinking that we are apt to be too prone to avail ourselves of the antipyretic series, while perhaps we are not plucky enough to make as much use as we might of the oxidizing properties of organic extracts. We find that retention of toxines, the products of incomplete oxidation, means prostration, depression, and general misery, whereas their elimination is attended by cheeriness and restoration to comfort of body and peace of mind, as in the cases already cited, where influenza arrested melancholia and a bout with a prize-fighter restored equanimity

I have tried to suggest some of the advantages of oxidation and the probable relationship between various obscure nervous states and deficient oxygenation. In our practice to-day we are called upon to treat a generation which is beginning to escape from the hereditary consequences of mercury and bleeding prescribed to their forbears. Evidences of attenuation are growing fainter, robust and sthenic types are not so rare as heretofore. The "Lydia Languish" of yesterday is being ousted by "Mary Fenwick's Daughter" of to-day; but we still meet with examples in both sexes of persons who, in spite of the fact that they were evidently meant to take plenty of healthy exercise and to breathe deeply draughts of fresh air, will not find time or opportunity for duly oxygenating their blood and oxidizing their tissues. It is our duty to enforce on our patients the paramount necessity of caring for their bodies, and in a race so addicted to outdoor pursuits and so fond of sport it is not often that difficulties are placed in our way. But spasmodic efforts to perform the allotted task make pain of pleasure, and too vigorous exercise after a long spell of inaction does more harm than good. The combustion processes must be maintained with regularity as well as vigor. We must endeavor to foster the chemical interchange between the blood and the tissues necessary to health by such means as will induce the introduction of sufficient oxygen and the more active oxidation of organic matters, raise the temperature, increase the secretions, and stimulate respiration and circulation.

WOULD IT BE EXPEDIENT TO EXTERMINATE THE BACILLUS OF TUBERCULOSIS?

By Lawrence Irwell, M.A.,
Buffalo, N. Y.

My article in the November issue of the Dietetic and Hygienic Gazette seems to have caused a considerable amount of comment as well as a great deal of surprise. One Southern publication, in an editorial a column in length, denounces me as a "crank" and a "kicker," and professes to believe that I advocate the abolition of the physician and of his art, in order that the beneficent microbes may, without hindrance, accomplish their allotted task. While fully conscious of the many defects of my literary style, I cannot realize that the meaning of any part of my former article was obscure. I am therefore justified, I think, in complaining that some of my opponents have criticised, not what I wrote, but what they assumed that I had written.

The climax of absurdity, however, seems to be well exemplified in the person of an attractive young lady—a "new woman"—who, having read my article, took the earliest opportunity of informing me of her desire to "whip" me, because the typical case cited by me referred, she supposed, to certain friends of hers! Moreover she expressed an ardent hope that no copy of my paper would reach the persons whom she imagined it described! What are we coming to, I ask; what can education be, if any reason exists when the truth, and the whole truth, should be so guarded that it will not reach the eyes and the ears of those most concerned in the practical application of it? And I assert, with great confidence, that not only has the complete accuracy of my data not been seriously challenged, but that the conclusions which I have drawn from the premises are strictly in accord with all recognized principles of logic, and are incapable of refutation.*

I have never said, nor have I ever penned, one word that would suggest approval of any act of inhumanity toward the tuberculous, or toward those who possess the phthisical diathesis; but I protest against consumptives being reproducers of the species. I have never urged that there was any objection to the extinction—if it could be accomplished—of all pathogenic microbes, *provided man did his own selecting by breeding from the "fit" specimens of the race, and from those only.* Assuming that the human family succeeded in counteracting the cosmic process, named by Mr. Spencer "the survival of the fittest," and assuming that it also neglected—as it is doing—to substitute any artificial method of selection, then the day of permanent racial deterioration would, most assuredly, have arrived. The reason why that period has not been reached is simply that man's power is limited to his ability to modify the process of Natural Selection, and at present his modification of it is very slight. In order that I may not, in consequence of any misconception of my opinions, be accused of inhumanity, let me again repeat that I most enthusiastically welcome any medical or sanitary treatment that may alleviate the suffering of mankind, if the sufferers from hereditary diatheses or diseases be taught that they are doing the race an injury by becoming parents. As far as I know, my views upon this subject differ from those of some of the highest medical authorities merely in the fact that they advocate legislative prohibition of the marriages of consumptives, while I venture to believe that the education of the community must precede any legal enactment, and that for some years to come any statute attempting to control the marriages of tuberculous persons would prove inoperative.

I beg to refer the reader to an extract† from an article written by Dr. Paul Paquin, of St.

---

* I cannot undertake to reply to critics who are obviously ignorant of the meaning of Darwin's term "Sexual Selection," or who imagine that "Evolution" and "Natural Selection" are the same thing. Elementary books upon "Evolution" are very numerous.

† I have not seen the article itself.

Louis, in the *Medico-Surgical Bulletin* for October last (page 1246), in which he says: "Children born of consumptives, whether of weak constitutions or not, are predisposed to the development of the disease because of their constantly infectious surroundings; and so those born feebly constituted are naturally fertile soil for the growth of tuberculosis."

"The marriage of a consumptive with a healthy person eventually increases each time the number of consumptives by one, as well as increasing the number of living, moving centres of infection by one, thereby increasing in every case the danger to the public at large. But this is not all. Such a marriage creates an infectious source of generation of new beings; such couples must always necessarily at some time or other bring forth more or less tainted constitutions, if they bring forth anything." "It is not denied that occasionally there may issue healthy children, so far as appearances may reveal, from a consumptive couple, but these children are from the very outset condemned to breathe and to grow in a polluted atmosphere, in which any organic weakness renders one susceptible to the infection."

"We need only to observe and reflect upon and study the families of consumptives and consider their history from the time of the parents' marriage to the adult growth and marriage of their children, *to realize that the marriage of tuberculous people is often a deliberate creation of a pest-house.*"*

If this gentleman is correctly reported, I am compelled to assume that he considers that a perfectly healthy man, not of the tuberculous type, may acquire the disease by contact with a tuberculous wife. With great respect, I submit that this is not the general opinion of the experts upon consumption. But the most important part of the excerpt from Dr. Paquin's article is the following paragraph: "Another strong argument against consumptives marrying is found in the question of the rights of children. In the majority of cases the children's rights are not even thought of before marriage. Justice demands that children's rights be considered and weighed, and there is no greater right of theirs than that they be born healthy. Except by unavoidable accidents no child should be born diseased, condemned in advance to live a life of suffering and to die young."

I commend this extract to some of my critics who appear to think that there is no objection to consumptives reproducing their species to the same extent as healthy persons.

The question naturally arises, How is it that the community tolerates the production of children by diseased parents? My reply is that in times gone by war and zymotic disease destroyed so many lives that very fertile nations were the only ones which survived. Further, the greater part of the diseased and unhealthy children died in infancy, as a result of improper food and insufficient attention. In those days there was no section of the community which showed, year by year, an increased tendency toward a disease—as the English-speaking world now does toward tuberculosis. The one great necessity was that of keeping the population large enough to prevent foreign conquest, and the parents of large families added so much to the belligerent power of the community that the reproduction of children was regarded as a virtue. Such babies as were unfitted for the battle of life did not, under ordinary circumstances, reach their second birthday. For these reasons marriage with a diseased person was not regarded as a crime against the unborn children and an injury to the proletariat; and, although the conditions have changed, the opinions of the community have not, because, as far as I know, nobody has been bold enough—"inhuman enough" sentimentalists will call it—to speak out.

I now turn to the question of the future of the race. A very full statement is necessary in order that I may make the position clear. Let me add that my object is to state solid facts and to drawn correct conclusions. Platitudes and truisms would be out of place in this article. Not being a physician, all purely pathological details are omitted, as they are outside the range of my knowledge—perhaps beyond my capacity.

---

* The italics are mine.

The living substance composing the higher organisms must be divided into two portions, the body, or soma, and the germ-plasm, or reproductive cells. In the developing animal certain cells are at a very early age set apart to form the reproductive elements, and about these the remaining cells build up a protecting body. The soma, after a certain period—it may be a few years, it may be a great many—breaks down and finally disappears. But the germ-plasm, if reproduction has taken place, gives rise to other individuals, and therefore to successive generations. While I cannot deny that the germ-plasm may be slightly influenced by the soma, that influence is of an extremely trivial character as compared with the results of Selection. I wish it to be distinctly understood, however, that, as the soma is the protective covering of the germ-plasm, I consider that any condition which will tend, even in the most minute degree, to weaken that soma permanently* will have a deleterious influence upon the germ-plasm, and consequently upon some future generation. If my neo-Lamarckian friends regard this statement as a concession to their opinions, they have my permission to extract all the comfort they can from it. The rule, then, is that "acquired characteristics" are not inherited, and the exceptions to that rule are not, in my opinion, either numerous or important. It therefore follows that the improvement which is made in an individual during his or her lifetime is not transmitted, in an appreciable degree, to the next generation, the representatives of which must begin life virtually where it was commenced by their parents. In other words, the extent to which fathers and mothers can pass on to their children the improvements which they have made in themselves is infinitesimal. If this is a correct statement—if neo-Darwinism is true—the action of education will never perceptively improve the congenital, mental, or physical condition of the children of the man who received the education; and hygienic measures cannot turn an unhealthy race into a robust one. Upon these lines racial regeneration is very tardy, for practically all the ground gained by the individual is lost after his death.

The paramount cause of racial improvement, or the reverse, is Natural Selection, no other process having any appreciable effect; and unless we arrange that each generation of infants shall be the product of the "fittest" portion of the community, none of our attempts to benefit humanity will be of any avail, as far as posterity is concerned. Gigantic efforts are now being made, however, to counteract nature's selective agencies—such as the microbes—and the probability of the survival of sickly children, who formerly expired at an early age, is on the increase. Nor is this all. The results of modern medical science are such that numbers of persons who, years ago, died prior to the age of twenty-one, to-day live long enough to marry and to become parents of debilitated offspring. Now, if all these data are accurate—and I admit the possibility of the neo-Lamarckian school denying the verity of them—the obvious inference is that the race is slightly deteriorating. The advantage of more healthy surroundings is unquestionably a benefit to the individual, but it means the degeneration of the race, *if the "unfit" part of the community reproduces its species in greater numbers than does the "fit" portion.*

In my former article I pointed out that the "fittest" section of the English-speaking world reproduces itself in small numbers as compared with the least "fit" section.

It is an indisputable fact that, while pathogenic micro-organisms cause curious changes in the blood and the tissues, these changes are not, *as a general rule*, of a lasting character, since they pass away when nature, assisted by the physician, has effected a cure. The only remnant of the disease is, I believe, a temporary—perhaps, sometimes, a life-long—immunity against a future attack by the same species of microbe. This immunity is probably due to some alteration in the condition of the leucocytes. More than that cannot be said, in the face of the abandonment of Metchnikoff's theory of phagocytosis. But I confidently assert that the germ-plasm has not been influenced, and that there is nothing in the physiological condition of the child at any age to indicate whether its parents have had diphtheria, etc., etc., or not. To this rule there may be exceptions. The microbe of syphilis, for instance, may produce a change in the germ-plasm. I venture, however, to doubt it, because I suspect that the conveyance from parent to offspring of the micro-organisms themselves is the cause of all the known phenomena. Heredity, which I define as "the transmission from parent to child of a physical characteristic," is responsible for a great deal—for insanity, for example. But the transmission of pathogenic microbes by means of the ovum, or the placenta of the mother, or by the spermatozoon of the father, is quite another matter; it is not "heredity," but "infection of the germ." It is certain, then, that parents who have suffered from scarlet fever, or typhoid fever, or whooping-cough, and from many of the other known micro-organic disorders, will beget as healthy children as if these complaints had never troubled humanity. *Tuberculous persons, upon the other hand, almost invariably transmit to their children a predisposition toward tuberculosis.*

---

*By "permanently" I mean extending over the entire lifetime of the soma.

In my former article I specially referred to consumption for three reasons, viz.: 1st, Because it is the cause of such a large percentage of deaths. 2d, Because the attacks of its microbe are not indiscriminate. 3d, On account of its connection with insanity. The first point demands no further elucidation.

The second, however, requires something more than a passing notice. The microbes of typhoid fever, diphtheria, measles, scarlet fever, and those of some other complaints, subsisting as they do upon healthy blood and tissue, attack persons living under hygienic conditions which are, in the main, though not in detail, satisfactory. Indeed, the strong and vigorous are believed to be more apt to acquire some of the diseases named than are the weak, although of course the latter more easily succumb. Therefore, these diseases, although selective from one point of view, are not selective in the sense in which tuberculosis is; nor is there any such thing as a distinct and objective diathesis toward any of them. *They are all inimical to race progress, because they often carry off the strong as well as the weak. The microbe of phthisis, be it understood, is specially the friend of the race, because it is its custom to attack the weak who have a marked tendency toward pulmonary complaints.* There are, of course, other micro-organisms whose selective agency in some respects (not in all) resembles that of the bacillus tuberculosus —the microbe of leprosy, for instance, which attacks feeble persons living under certain unhygienic surroundings. Remove the surroundings and the disease disappears. I ask my readers to note that phthisis is a unique disease, not only in the existence of a marked and often easily apparent diathesis toward it, but also in the fact that the phthisical type may be found amongst all classes—in the homes of the poor as well as among the wealthy and the well educated, who conform to all known sanitary regulations. *The conclusion must therefore be drawn that whatever may be done in the way of preventive medicine, the tuberculous type of individual will permanently remain, will be permanently liable to attacks of all pulmonary diseases, and will be quite certain to produce children having a tendency toward consumption.* The question of how the diathesis is acquired I must leave to the pathologists. I beg permission, however, to submit that many cases in which the tuberculous predisposition is said to have been acquired are in reality due to atavism.*

I now turn to the third point. If there is one reason more than another why the best interests of the race forbid parentage upon the part of the tuberculous, it is the intimate connection between brain disorders and consumption. Consumption appears ten years earlier in life among idiotic children than among others; and the near relatives of families, in which are found idiotic children, are from eight to ten times more liable to consumption than are those not so affected. I have also noticed many cases of what I must call "phthisical mania" amongst young people, both girls and boys, ***who are not suffering from the complaint***, but who display the diathesis. I again refer to Maudsley ("The Pathology of the Mind," 3d edition, p. 477). "It is acknowledged," writes this great alienist, "that phthisical insanity, so-called, may befall on persons of the phthisical diathesis who have no symptoms of local tubercular deposit." These persons, I have found, are irritable, capricious, and show weakening of the intellect; some of them, indeed, are so erratic that one often doubts their ability to take care of themselves; and, while displaying an aversion to mental exertion, all of them at times give evidence of the possession of a more or less normal intelligence.

---

*A discussion as to whether an acquired diathesis can be transmitted or not would be out of place here.

In brief, I claim to have proved that, from the point of view of the biologist, the action of the micro-organism of consumption differs *in toto* from the microbe of any other complaint; that its selective agency is unlike any other selective agency which is at work in the English-speaking world; and that it is impossible to exterminate the fertile soil upon which it makes its virulent attacks. In addition I have shown that the phthisical type is a type which, apart from tuberculosis itself, is detrimental to the welfare of the race, in consequence of its intimate connection with brain disorders and of its liability to numerous pulmonary diseases.

Marriages upon the part of the insane have now, happily, become uncommon. But persons with strong strains of insanity—the most hereditary of all diseases—in their families marry quite frequently.* As far as my observations are concerned, young men and girls of the phthisical type, while partially realizing the dangers of wedlock, entirely disregard them; and the nuptials of consumptives, and of individuals prone to consumption, are celebrated almost every day in the year. The influence of what is called "love"—which, I insist, is, in most instances, nothing more than "sexual selection"—(or of money) easily counteracts the teaching of any number of more or less scientific "cranks," like the writer; and as a consequence the race will continue to show slight traces of deterioration until public opinion is definitely aroused.

Call the man who steals a loaf of bread when his children are starving a "criminal" if you choose, and punish him as such. But, as a matter of common honesty, use the proper appellation concerning the individuals, men or women, who knowingly bring into the world children who are almost certain to suffer from tuberculosis and its concomitant disorders of lungs or brain, or both. Such persons are the enemies of their race and of their country, to say nothing of their offence against their own offspring. Strong language, you say, and yet not strong enough, I fear, to arouse the popular conscience to a sense of its duty.

Begging my readers to bear in mind that the inheritance of the tuberculous diathesis is the rule, and that its acquisition is not so common, I present some statistics. First, however, let me quote from the work of Dr. N. S. Davis, of Chicago, on "Consumption" (page 18): "The predisposition comes either by inheritance or by acquisition. ***It is inherited from consumptive parents in almost every instance.*** I have already explained how rarely the bacilli are transmitted from parent to child as an inheritance, ***but predisposition is almost invariably transmitted.***"*

Estimating the total yearly mortality of the world at 35,000,000, we find that about 5,000,000 deaths are due to consumption, being the greatest number reported by reliable observers as due to any single cause of death.

The total number of deaths in the United States in 1880 was 756,893, and the number of deaths from consumption was 91,270, being the greatest number reported as due to any single cause of death. In fifty large cities, out of each 1000 deaths from known causes, consumption caused 131.9 in males and

---

* The instance cited in my article in the November GAZETTE can be duplicated any number of times by any careful observer.

* The italics are mine.

144.2 in females; and in the rural districts it caused 101.9 deaths in males and 146.6 in females.

"These are the bald, relentless records of the deaths." Further statistical information can be obtained by consulting Dr. George Evans's "Phthisiology."

I cannot leave this aspect of the case without referring to Dr. A. L. Benedict's assertion in the November (1895) number of the *Popular Science Monthly* that "it is estimated that one-third of all deaths occurring in the medical wards of hospitals are due to tuberculosis, and that a fifth of all surgical cases treated — many of which are cured—are tubercular."

I conclude. That everything should be done for the comfort and the welfare of the unfortunate people who suffer from consumption or its diathesis is, of course, evident to every one. But we must educate them in such a manner that they will understand that parentage upon their part is unjust to the children as well as a serious detriment to the human family; and unless this doctrine can be instilled into the phthisical mind so that practical use is made of it, the community cannot afford to dispense with the services of the bacilli of tuberculosis. When man's forethought is utilized as a selective agent, then racial regeneration will be a certainty.

THE WORK OF FOREIGN VETERINARIANS ON BOVINE TUBERCULOSIS.*

By Prof. Leonard Pearson,

VETERINARY DEPARTMENT OF THE UNIVERSITY OF PENNSYLVANIA.

Mr. President and Gentlemen :— In the short time that I shall occupy I shall express no views of my own, but shall call to your attention some of the recently expressed opinions of European veterinarians on the subject of bovine tuberculosis, and some European practices and rules in relation to this matter.

This subject has been a live one in Europe for many years, and has received much attention ever since it was shown by Villemin, in 1868, that the disease could be transmitted from one animal to another, and more especially since the discovery of the tubercle bacillus by Koch in 1882, and the consequent establishment of the fact that the tuberculosis of men and the lower animals is the same disease and caused by the same germ. The first practical application of this knowledge, with a view of preventing human infection through the ingestion of tuberculous food of animal origin, was in relation to the inspection of meats. Without tracing the development of official meat inspection in the various countries of Europe, suffice it to say that most of the European countries have a more or less perfect system of meat inspection, which is carried out most carefully in the great centres of population, and usually insures the consumer against harmful flesh.

The method that is in vogue in many cities in Germany, and is being extended as rapidly as possible, consists in the erection of a municipal abattoir in which all local slaughtering must be done, and where the food animals can be examined by the veterinarians stationed there, both before and after slaughter. This allows a perfect inspection, which is impossible when the killing is done in a great number of small slaughter-houses scattered throughout a large city.

The question as to what shall be done with tuberculous carcasses has excited much discussion. There is a great unanimity of opinion in reference to the carcasses of animals that show generalized tuberculosis, or tuberculosis with marked emaciation they should be destroyed outright. But cases of localized tuberculosis are much more common, amounting in some places to fifteen or eighteen per cent. of all cattle slaughtered, and to destroy these carcasses would occasion a great loss which should be avoided, if it is possible to do so without prejudice to human health. The careful experiments of Chauveau, Nocard, Bollinger, Bang, and McFadyean have shown that the flesh of animals with local tuberculosis is not infectious. But Ostertag and others call attention to the fact, which is brought out more clearly by the Royal Commission on Tuberculosis in its report of 1895, that healthy muscles may carry tuberculous lymph glands between them, and that in dressing carcasses the butcher frequently gets tuberculous material on his knife, if such exists in any part of the body, and thus spreads it onto otherwise harmless meat. Hence, it has been evident for a long time that great care must be exercised in judging tuberculous carcasses. Since 1886 it has been the custom in some countries, as in Portugal, to destroy the carcasses of all tuberculous animals, and in Italy, Austria, France, Germany, and Belgium much flesh was formerly destroyed that is now saved. When meat inspectors were few, and systems imperfect, it was necessary, in order to be on the safe side, to have few and rigid rules, but with the increase of experience and knowledge it has been found that these rules can be modified and made flexible when they are enforced by skilled men. At the International Veterinary Congress, held last September, in Berne, it was decided by resolution that the flesh of tuberculous animals should be condemned when the carcass is emaciated, when it has a general bad appearance, when tubercles are found in the muscular portions, and when alterations are found in several organs. It was also recommended, in relation to the flesh of slightly tuberculous animals, that it be permitted to go on the market, that it be sold in special shops or stalls, or that it be sterilized and sold as cooked meat. But this resolution implies a doubt as to the wholesomeness of some of the meat passed, and leads one to the conclusion that a fear exists that the rules for condemning are not sufficiently comprehensive. In Germany the practice is to condemn the worst cases, sterilize those that are less extensive, and to pass as sound the slightly developed cases, after destroying the affected parts.

---

* A paper presented to the New York Academy of Medicine, November 8, 1895.

A very important point in connection with this subject is in reference to the payment of indemnity to the owner of the condemned animal or carcass. The opinion has spread rapidly of late years that where an animal is condemned for the good of the public, the public should bear a part of the loss. That this view is established abroad is shown by another resolution adopted by the International Veterinary Congress, to the effect that owners should be compensated for animals destroyed, and this is already the practice in France.

The consideration of the milk from tuberculous cows is another major division of this subject, and probably of greater importance to the sanitarian than their flesh, for while the latter is usually eaten after cooking and more or less complete sterilization, the former is usually consumed raw.

Numerous investigations have demonstrated that the milk of cows with tuberculosis of the udder will cause tuberculosis in a very large percentage of the experimental animals fed upon it, and in reference to such experiments the Royal Commission on Tuberculosis reports in these words: "We cannot refuse to apply, and do not hesitate to apply to the case of the human subject the evidence thus obtained from a variety of animals that differ widely in their habit of feeding—herbivora, carnivora, and omnivora. As regards man we must believe—and here we find ourselves agreeing with the majority of those who gave evidence before us—that any person who takes tuberculous matter into the body as food incurs some risk of acquiring tubercular disease. By 'tuberculous matter' we mean here, of course, that which is capable of giving rise to tuberculosis in lower animals."

The active bacilli of tuberculosis have been found in the milk of tuberculous cows by numerous investigators, and among them such distinguished veterinarians as Chauveau, Nocard, Bollinger, and Johne.

At the Seventh International College of Hygiene, held in London in 1891, Professor Bang, of Copenhagen, reported his experiments with fifty-eight tuberculous cows, of which nine were found to give virulent milk. He expressed the opinion that a tuberculous cow with udder apparently healthy is not, in the great majority of cases, dangerous, although she is undoubtedly so sometimes, and is always suspicious. Professors McFadyean and Woodhead, who reported at the same time, demonstrated the extreme danger of cows with tuberculous udders, and the occasional infectiousness of milk from cows with the disease in organs other than the udders. From the results obtained from the experiments, and by all other investigators, they conclude that the milk obtained from tuberculous animals may be instrumental in causing the disease in man, and that there is great necessity for legislation on this question.

They state further that the first thing to be insisted on is that a regular staff of veterinary inspectors, well trained for this special work, shall be appointed, whose special duty it must be to examine fortnightly all the cows giving a milk-supply, and who should have the power to order isolation of all cattle in which the presence of tuberculosis is suspected.

In the more recent report of the Royal Commission on Tuberculosis in Animals, the statement is made that "the withdrawal from dairies of every cow that has any disease whatever of the udder would form some approach to security against the serious danger incurred by man from the use of tuberculous milk, but it would not be an adequate security." The presence in a dairy of a tuberculous cow, the report says, is a decided source of danger to the public, especially having regard to what has been learned respecting the rapid development of tuberculosis of the udder, and the degree of danger to the milk-consumers incurred by the invasion of the udder in tuberculous cows.

Attention is also called in this report to a most important observation in reference to the alarming rapidity with which tuberculosis of the udder may develop, and cases are cited in which this condition became evident between fortnightly inspections. The investigators for the commission insist that no tuberculous animal of any kind should be allowed to remain in a dairy. Ostertag has called attention to the fact that to exclude from sale the milk of all cows that react to tuberculin would mean a great shrinkage in the milk-supply in some places, and would cause a great and oppressive rise in the price of this necessity. He recommends therefore that the milk from cows with tuberculosis of the udder should be excluded from consumption, and that from cows which react to tuberculin, but show no evidence of tuberculosis of the udder, should be sterilized before sale.

Another important division of the subject assigned to me is that in reference to the eradication of this disease from herds; and since all exterminative measures necessitate the diagnosis of disease in the living animal, I shall present some views in relation to tuberculin as a diagnostic agent, for diagnosis without this agent is so inaccurate and untrustworthy, except in advanced cases, that it now receives but little credence. The use of tuberculin is so recent, and its career as a therapeutic agent was so short and disappointing, that there was a strong feeling against its employment as a diagnostic agent in cattle practice until its worth and harmlessness had been demonstrated beyond a doubt. Nocard in France, Bang in Denmark, Guttman in Russia, and Siedamgrotzky in Germany, have taken the lead in this work.

The original researches with tuberculin showed from ten to fifteen per cent. of failure to diagnose correctly, but with improved methods and increasing experience the proportion of failures in the hands of careful veterinarians is now so small as to be almost disregarded. Nocard, Guttman, and Bang, who have had the most experience with this agent, claim almost invariably exact and accurate results. There was a tendency among a few veterinarians at the recent International Veterinary Congress, and notably on the part of Guillebeau and Hess, of Berne, to oppose the use of tuberculin for diagnostic purposes on the ground that it caused pre-existing tubercular processes to become generalized. This view, however, was not supported by any of the other veterinarians present, and was expressly refuted in the resolutions adopted. These resolutions, which represent the most recent opinions of the foremost veterinarians in Europe, and which were adopted at the International Veterinary Congress held but two months ago, are of great interest to us, for they are based on five years of trial, experiment, and practical application of this agent, often in the face of strong opposition, always under careful, scientific supervision.

Resolution No. 1 is: "Tuberculin is a very valuable diagnostic agent, and can yield the greatest assistance in combating tuberculosis. There is no reason for objecting to its general application on the ground that it may aggravate pre-existing tuberculous lesions."

Resolution No. 2 is: "The Congress expresses the desire that governments shall order the employment of tuberculin in herds in which the existence of tuberculosis has been established."

The official veterinarians of Germany are advised to use tuberculin, and are supplied with it at a low cost from the government laboratories.

A law is now pending in France that will make the use of tuberculin compulsory in all herds in which tuberculosis has been discovered. The infected animals are to be slaughtered, but if they present no clinical evidence of tuberculosis, and the owner wishes to prepare them for slaughter, he is allowed to keep them under quarantine for one year. If upon slaughter it is found that the flesh is unfit for food, the owner will recover an indemnity equal to one-half of the value of the condemned meat. If clinical evidence of tuberculosis exist, the animal must be slaughtered at once, and the owner receives but one-fourth of the value of the condemned meat.

In Dieckerhoff's "Lehrbuch der speciellen Pathologie und Therapie für Thierärzte," published in 1894, and generally recognized as the most reliable work on veterinary practice, this statement occurs: "It is for the owner's interest to have his herd tested with tuberculin in order to discover the suspicious animals, so that they may be separated and placed in another stable, and slaughtered as soon as possible. The calves from tuberculous bulls and cows should not be used for breeding. If these prophylactic measures are not observed, it can happen and has frequently been exemplified that the value of the herd will be destroyed."

One of the prominent and important steps in all plans for the restriction of bovine tuberculosis that have been proposed by European veterinarians is the compulsory meat inspection. This furnishes information respecting the location of infected herds, and enables much of the flesh of condemned animals to be saved. While without a general system of meat inspection, more time must be devoted to the discovery of infected herds, and the flesh of most of the animals in which tuberculosis is diagnosed must be lost.

So much ground has been covered that I hope I may be allowed in closing to make a very brief résumé of some points still unsettled in this country, on which the veterinary profession in Europe is practically unanimous. This résumé is based upon resolutions adopted at representative gatherings of veterinarians during the past two years, or on the *unopposed* publications of distinguished veterinarians.

1. The system of compulsory meat inspection should be general.

2. The flesh of tuberculous animals should be subject to special regulations.

3. A part of this flesh must be destroyed, but some of it may safely be used for food.

4. The milk from cows with tuberculous udders is extremely dangerous.

5. The milk from tuberculous cows with apparently healthy udders may be dangerous and is always suspicious.

6. Tuberculin is a reliable diagnostic agent.

7. There need be no fear that tuberculin,

properly used, will cause generalization of pre-existing disease.

8. All tuberculous herds should be tested with tuberculin, and the tuberculous and healthy animals separated.

9. Since tuberculosis of cattle is of importance in relation to public health, as well as of importance in relation to the live-stock industry, it is to the interest of every one that the disease be restricted as much as possible. Hence, when it becomes necessary to condemn tuberculous animals or carcasses, the public should share the loss with the owner.—*Vet. Mag.*

OFFICIAL INQUIRIES AND DANGEROUS TRADES.

In addition to what has already been accomplished by departmental committees, the Home Secretary has appointed another special committee to inquire into the effects of certain dangerous trades upon the health of the work-people. As to the necessity for such there can be no doubt. To factory owners it may appear as if Parliament was interfering too much with the methods of production and restraining individual freedom, and that excessive legislation was becoming prejudicial to commerce. There are limits on both sides. It is the duty of a government, however, to see that in those operations which make for wealth the health of those employed is not imperilled. There are many men and women in this country whose health is so deteriorated that their life's race is practically over at the age of forty, and who, had they been sufficiently protected, might still be wage-earners instead of being a burden to their friends or to the union. Great Britain has been the pioneer in movements which concern the health of the public, and although much still remains to be accomplished, the sanitary condition of our industries compares most favorably with that of other nations. With the view of supplying carefully sifted and scientific information, the Home Secretary has appointed a special committee, composed of Mr. H. J. Tennant, M.P., Captain Smith, Miss Abraham, and Professor T. Oliver, of Newcastle, to deal with a number of trades that have been scheduled as dangerous. All the members of the committee have had special training for the work, having gained experience whilst previously serving on other inquiries under Mr. Asquith's directions.

The investigation about to be undertaken is practically a continuation of that in which the ex-Home Secretary not only took such an active interest, but with which his name will be for long identified. Sir Matthew White Ridley, as his successor, is equally strong in his conviction as to the necessity for such investigations, a circumstance which at once removes them from the sphere of party politics, and gives them a truly national character.

The presence of a lady on the committee is a novel feature. When Mr. Asquith, as Secretary of State, recommended the appointment of female factory inspectors there were many dissentient opinions throughout the country as to the advisability of such a procedure, not less on economic than on social grounds. Lapse of time has allayed suspicions, and the high character of the work which Miss Abraham and her sister colleagues have accomplished has created a feeling of confidence in them as inspectors, and a belief that many of the minor defects of factory legislation and personal details attendant upon the ordinary routine of industrial life which told specially upon women, and which were overlooked or unrecognized, have by their influence been diminished or removed.

To this special inquiry, therefore, Miss Abraham brings considerable experience gained whilst investigating the effects of the various textile industries upon the health of women. One of the most valuable investigations which this committee could undertake, and for which it is particularly qualified, would be a consideration of the effects of certain dangerous trades upon pregnant women and upon infant mortality. The baneful influences, for example, of phosphorus are known so far as they affect the bones of the jaw, but there has been in this country no such inquiry as that carried out by Magitot in France to illustrate the frequency of abortion in pregnant women engaged in the manufacture of matches and other industrial pursuits.

Departmental inquiries of such a nature as that of which we speak are not meant to revolutionize trade, but rather that our industries may be conducted on lines which safeguard the health of the workers. Men not less than women and children require protection.

The supersession of hand labor wherever possible by machinery, and the many changes which are creeping over the social life of to-day are seriously altering not only our methods of production, but throwing into the industrial arena a larger number of young people that hitherto. It is one of the complaints of trade union benefit societies that there is a gradually increasing number of the older workmen who are unable to find employment. The race is to the young and vigorous. Competition, both physical and mental, presses keener and keener; and whilst the tendency is for the number of the older hands to be diminished, there is, as Miss Collet has shown in her recent "Report on the Employment of Women and Children" presented to the Board of Trade, a distinct increase in the number of young people employed under the age of 15. Miss Collet's statistics do not support the current opinion that women's employment is extending, and that women are displacing men, but they demonstrate a decided increase in the number of women and girls employed under 25 years of age. Leaving aside the fact of the concurrent increase in the number of males employed between 15 and 25, the increased number of girls employed under 15 years of age calls for one remark. It is as the period of puberty is approaching that girls are sent to trades, where, either as the result of long hours, standing on their feet all day, and, it may be, breathing a vitiated atmosphere, the menstrual function becomes deranged and the foundation of anæmia laid. It is gratifying to find from Miss Collet's report that the number of married women employed in this country is diminishing—a circumstance which points to increased material prosperity on the part of the men in the rank of life to which they belong. So far as we have been able to ascertain, it is not, however, to the disabilities created in one sex alone by dangerous industries that this inquiry will be directed. The health of men, not less than that of women and children, will be the object of investigation, and from the constitution of the committee we may rely upon this being done in a thorough and efficient manner.—*Brit. Med. Jour.*

Department of Physiological Chemistry.

WITH SPECIAL REFERENCE TO DIETETICS AND NUTRITION IN GENERAL.

Edited by R. H. Chittenden, Ph.D.
Professor of Physiological Chemistry in Yale University.

THE CONTENT OF FAT IN DRY MILK-FOODS FOR INFANTS.

In the October number of the Gazette (1895) attention was called to the deficiency of fat in dry milk-foods for infants as compared with mother's milk, and emphasis was laid upon the practical impossibility of manufacturing successfully a dry food by the evaporation of pure cow's milk, which on solution in water would yield a fluid resembling or analogous to mother's milk, especially in its content of fat. Further, in this connection analytical results were given showing that at least two widely used dry milk-foods, when prepared for the nursing-bottle as directed, contained a very much smaller amount of fat than human breast-milk. Since the above paper was written, however, certain facts have come to the writer's notice which have necessitated a reconsideration of this question, and although the work we have done in this direction has not led to any material modification of our views upon the main subject, it has emphasized the importance of carefully considering the methods now in use for the determination of fat in dry food-products, and rendered necessary a modification or correction of some of our previous statements.

The analytical chemist, whose work lies mainly in the domain of organic or physiological chemistry, would probably consider a determination of the amount of fat in a dry and finely pulverized substance as a simple operation. The conventional method, in use now for many years, consists merely in thoroughly extracting a weighed amount of the powder with warm anhydrous ether—preferably in some form of extraction-apparatus, such as Soxhlet's—and weighing the fat so abstracted, after suitable drying at 100° C. This is the method universally used, and so far as I am aware it has never been the subject of any decided criticism. By such a method as this the writer found on analysis of a sample of "malted milk" 1.94 per cent. of fat, the duplicate determinations agreeing so closely that the possibility of error was obviously not to be considered. Shortly after the publication of the above article a paper was received from the physiological institute at Bonn,* calling attention to the fact that dry, finely pulverized muscular tissue—freed from all visible fat—gives up its contained fat to ether very slowly and incompletely. Indeed, Dormeyer states that even after 100 hours' continuous extraction with anhydrous ether in a Soxhlet apparatus only $\frac{1}{5}$–$\frac{1}{4}$ of the contained fat can be removed, even though the material be brought to the finest state of division. The full complement of fat was obtained only by digesting the muscle-tissue with active gastric juice and then extracting the resultant solution with ether. The fat was found to be ordinary neutral fat, readily saponifiable by alkali. At about this same time the writer received a letter from Dr. R. C. Hindley, chemist to the "malted milk" company, stating that the amount of fat contained in this product was much greater than had been reported.

These facts naturally led to a reconsideration of the matter; analysis of the product was repeated, and to make the trial as thorough as possible two determinations were made upon widely different amounts of material. The extraction with anhydrous ether was made in an ordinary Soxhlet apparatus, and was continued for eight hours with the following results:

---

* Die quantitative Bestimmung von Fett in thierischen Organen. Vorläufige Mittheilung von Dr. phil. C. Dormeyer, *Pflüger's Archiv f. Physiol.*, Band 61, p. 341.

	"Malted milk" employed	Amount of fat found.	Percentage of fat.
(A)	2.1401 grams.	0.0425 gram.	1.98
(B)	5.6738 "	0.1105 "	1.94

Especially noticeable is the close agreement of these two results; an agreement which, taken in connection with the wide difference in the amount of substance employed, gives an air of accuracy quite convincing. Indeed, it is very plain that the dry powder contains only 2 per cent. of fat capable of being extracted by ether, and yet these figures represent only about one-fourth of the total amount of fat actually present in the preparation. In other words, the ordinary method of extracting fat from a dry and finely divided powder will not remove from the "malted milk" powder more than one-fourth of the contained fat.

That this preparation contains a far larger amount of fat than was at first reported we have been able to demonstrate by the following method: Dissolve, say 0.8 gram of the powder in about 8 c.c. of warm water, and allow the fluid to be absorbed by a fairly large bulk of freshly ignited asbestos-wool contained in a Schleicher and Schüll paper cylinder (such as is used for fat extractions), using 1–2 c.c. of distilled water to transfer the fluid wholly to the asbestos. By this method the fat-containing fluid is distributed over a large surface, after which the paper cylinder with its contents is dried in an air-bath at about 50°–60° C. for some hours, and finally for about two hours at 100° C. The cylinder is then introduced into a Soxhlet tube, and extracted with ether for 7–8 hours, etc. The following figures obtained with the sample of "malted milk" previously analyzed may be quoted as showing the character of the results yielded by this method:

	"Malted milk" employed.	Amount of fat found.	Percentage of fat.
(A)	0.8079 gram.	0.0642 gram.	7.94
(B)	0.8079 "	0.0635 "	7.85
(C)	0.8333 "	0.0659 "	7.90
(D)	0.8333 "	0.0658 "	7 89
(E)	0.8333 "	0.0665 "	7.98
(F)	0.8333 "	0.0670 "	8.04

Especially noteworthy is the fact that the yield of fat by this method is just about four times the amount obtainable by direct extraction of the dry powder with ether, thus agreeing with Dormeyer's statement concerning dry and finely pulverized muscle-tissue. These results certainly raise a doubt concerning the reliability of the ordinary method for the determination of fat in such products, and render it necessary for the careful chemist to consider this possible source of error. Whether this danger is widespread, or whether it is limited to certain peculiar or specific mixtures or products, the writer does not know. At first glance it might be assumed that this difficulty of completely extracting the fat with ether is purely a mechanical one, dependent upon the possible lack of fine division of the particles, or to the compact packing of the powder in the extractor. These suggestions, however, are quickly negatived by the fact that several products resembling "malted milk" in their physical properties, recently analyzed by the writer, yield their contained fat readily and completely to ether by the ordinary method of extraction. Again, the close agreement in the results obtained with such widely different amounts of "malted milk" powder as 2.1 grams and 5.6 grams, otherwise under like conditions, suggests that a certain proportion of the fat—one-fourth—exists free, while the remaining three-fourths exist in some loose combination with the carbohydrate or albuminous matter of the compound; and in this connection the close analogy of these results with the results reported by Dormeyer in the analysis of muscle-tissue is quite striking and suggestive. Unless we accept some such explanation as the above, it is difficult to understand why the fat in "malted milk" should not be as readily dissolved by ether as that contained in similar products. Several hours' continuous extraction with ether would seemingly be sufficient to entirely remove the fat present, no matter how closely it may be blended, or how intimately it may be mixed with the saccharine and other soluble constituents of the malted cereals used in the preparation of "malted milk," assuming no chemical combination to exist.

Whatever the true explanation may be, it is very plain that the sample of "malted milk" examined by the writer contains at least 8 per cent. of available fat. According to Dr. Hindley, "malted milk" is intended to contain on an average 8.5 per cent. of fat. This statement the writer is quite willing to accept, although in this particular sample he has not been able to obtain evidence of more than 8.04 per cent. Dr. Hindley also states that he likewise "finds it impossible to extract from the powder much more than 2 per cent. of fat by the ordinary method." He employs a method for determining the fat similar to that used by the writer, and he lays special stress upon the necessity of drying the aqueous solution of the powder at a low temperature so as to prevent "caking" of the product.

We regret exceedingly the publication of any statement not strictly accurate, and consequently take pleasure in making the above correction. At the same time, candor compels us to express the opinion that the responsibility for this misstatement rests mainly with the manufacturers of this food-product. The product is issued without statement as to its chemical composition other than that it is "composed of pure, rich cow's milk combined with an extract of malted grain," and that "its chemical, physical, and physiological properties resemble very closely the infant's natural supply." The fat of mother's milk offers no such difficulty in its extraction with ether, and hence the chemist unfamiliar with the product would have no cause to suspect the inadequacy of the ordinary methods of analysis. The manufacturers, however, being well aware that only one-fourth of the contained fat could be detected by the ordinary method of extraction, have, it seems to the writer, voluntarily put themselves in a position where their product might be misjudged.

However this may be, it is obviously necessary, in view of the facts, that some of the statements made in the preceding paper upon this subject should be modified. Thus, "malted milk," assuming a content of 8.5 per cent. of fat, when prepared for the nursing-bottle with the maximum amount of water directed for an infant from three to six months would contain about 0.48 per cent. of fat, *i.e.*, one-eighth the amount of fat present in mother's milk—mother's milk containing 4 per cent. of fat. Prepared as indicated for infants of six months, the mixture would contain 0.64 per cent. of fat, while with the minimum amount of water specified for infants from six to twelve months the prepared food would contain about 0.93 per cent. of fat. Hence, the young infant fed solely upon such a diet will in the two last instances have a food with about one-sixth to one-fourth the amount of fat contained in mother's milk. Our inquiry was originally intended to call attention simply to the deficiency of fat in dry milk-foods for infants as compared with mother's milk, believing as we do that the best and most natural food for the infant is that which approximates most closely to the infant's natural supply. The corrections we have made in regard to the fat content of "malted milk" plainly show that this deficiency of fat is not as great as was originally stated, but it is equally evident that a deficiency exists, and to a very noticeable degree, in comparison with mother's milk. We can therefore make no exception to the general statement previously made that in the use of dry milk-foods the addition of fresh cream is as essential or more so than it is with ordinary fresh milk as commonly diluted and prepared. We are well aware that the food in question contains considerable dextrin as well as maltose, but we do not believe that these are perfect substitutes for the deficient fat. An infant, no doubt, may manufacture fat from carbohydrates, but nature evidently has some reason for supplying the young infant with the large amount of fat contained in mother's milk, and there would seem to be no justification for the claim that dry milk-foods resemble very closely in chemical and physiological properties the infant's natural supply, when there is this marked deficiency of fat, and a large substitution of maltose and dextrin, both of which are absent from human milk.

Malted milk as well as other dry milk-foods are no doubt possessed of high nutritive value, but there should be a clear recognition of the fact that such foods, when contrasted with mother's milk, are greatly deficient in the fat which is so characteristic of the latter fluid.

Again, in our previous paper upon this subject the suggestion was made that the comparatively small amount of fat contained in ordinary dry milk-foods might be explained on the assumption that the foods in question were manufactured with milk from which a portion of the cream had been removed, or else that the amount of whole milk employed was small in proportion to the other constituents used in the preparation of the product. Pure cow's milk contains on an average 13 per cent. of solid matter, of which nearly one-third is fat. Hence, the evaporation of pure *rich* cow's milk to dryness would result in a residue containing approximately 33 per cent. of fat. It is thus evident that a dry "milk-food" containing 8.0–8.5 per cent. of fat, if manufactured from whole milk rich in fat, must have considerable material other than milk added to it; indeed, the above figures would suggest in the finished product a mixture of approximately one-fourth whole milk solids and three-fourths of some other material, assuming the latter to be wholly free from fat.

We believe there is wisdom in the modern tendency in infant feeding to approach as closely as possible to mother's milk. Granting this, due weight must be given to the fat or cream which is such a conspicuous element in breast milk. To make good this deficiency by addition of carbohydrates of various kinds can hardly be expected to give as satisfactory results as addition of fat, for fat is plainly an essential element in the nutrition of the infant as well as of the adult, and its place cannot be wholly taken by carbohydrates. It would be folly in infant feeding to attempt any positive statements on general principles as to how much fat or how much carbohydrate the infant should have. We can simply look to mother's milk, and, taking that for our standard, rest assured that in following nature's leading we cannot greatly err.

THE AMOUNT OF IRON IN ORDINARY DIETARIES.

EVERY one recognizes the importance of iron in the nutrition of the body, but few realize how small an amount of this essential element suffices to satisfy the needs of the organism. Until recently, most of our knowledge regarding the content of iron in the daily food has been based upon the statements of Boussingault embodied in a paper published in 1872, in which he tabulates a number of analyses of the amount of iron in various articles of food and drink, and then calculates the amount of iron in a number of daily dietaries. Thus, he states that in the daily dietary of a French sailor the iron amounted to 0.066 gram, in the dietary of a French soldier 0.078 gram, of an English workman 0.0912 gram, of an Irish laborer 0.109 gram, and of a convict 0.059 gram. In these cases the cooked food actually consumed was not analyzed, but the amounts were estimated from analyses of the raw articles. It is generally conceded, however, that the older estimates of iron in organic substances are too high, owing to somewhat faulty methods of analysis, and Stockman * has just published the results of an investigation of this subject which may be advantageously quoted. In this work the exact dietary of various persons was obtained, and the whole day's food carefully tested for iron by the use of accurate methods and with care to eliminate all sources of error.

---

* *Journal of Physiology*, vol. 18, p. 484.

The results obtained were as follows:

		Iron in Milligrams.
1.	Ordinary diet, Royal Infirm., Edinburgh	9.3
2.	" " " " "	6.0
3.	" " " " "	14.0
4.	Convalescent diet, " "	6.3
5.	" " " "	6.1
6.	My own diet	8.0
7.	" " "	10.9
8.	Diet of a young lady	8.0
10.	Lady, somewhat older, married	7.0
11.	Nurse, Deaconess Hospital, Edinburgh	9.2
13.	Nurse, Royal Infirmary, Edinburgh	8.0
16.	Domestic servant (chlorotic)	2.8
18.	Factory girl (chlorotic)	3.2
20.	Fæces of man on full diet	12.0

With regard to the diets it is stated that the "ordinary diet" of the Royal Infirmary at Edinburgh consists of meat, 8 oz. (uncooked); vegetables, 12 oz.; bread, 16 oz.; barley, peas, or rice, 1½ oz.; salt ¾ oz.; tea, ¼ oz.; sugar 1¼ oz.; milk, ½ or 1 pint; butter, 1 oz., with porridge and buttermilk.

The "convalescent diet" consisted of either fish, 8 oz., chicken, 6 oz., or minced collops, 6 oz.; bread, 16 oz.; vegetables, 8 oz.; salt ½ oz., tea, ¼ oz.; sugar, 1¼ oz.; milk, ½ or 1 pint; butter, 1 oz.

In the case of the chlorotic servant, No. 16, the difference in the amount of food ingested, and consequently of iron, was quite striking. Her meals were composed as follows:

Breakfast: cup of milk, bread and butter.

Dinner: soup, small piece of chicken, and small piece of bread.

Tea: tea and bread, or very often nothing.

Analyses were also made by Dr. Stockman of a few common articles of food, and also of bone-marrow, with a view to determining their content of iron. The results obtained were as follows:

		Iron in Milligrams.	
1.	568 c.c. sweet milk (1 pint)	2.2—3.8	mgs. per 1000 c.c.
2.	700 c.c. sweet milk	1.4—2.0	" "
3.	650 " skim milk	2.8—4.3	" "
4.	100 grams oatmeal (88 grams dried at 110° C.)	3.1—3.5	per 100 g. dried.
5.	300 grams fine bread (210 grams dried at 110° C.)	1.8—0.85	" " "
6.	280 grams common bread (180 grams dried at 110° C.)	1.1—0.61	per 100 g. dried.
7.	20 grams yellow ox-marrow	0.8—4.0	" " "
8.	26 grams yellow ox-marrow	1.0—3.8	" " "
9.	100 grams yellow ox-marrow	2.5—2.5	" " "
10.	26 grams red calf-marrow	2.0—7.6	" " "
11.	40 grams red calf-marrow	3.5—8.7	" " "
12.	120 grams lean beefsteak (27 grams dried)	4.7—3.9	" " "

"Number 2 agrees closely with Bunge's analysis, who found 2.4 milligrams of iron in 1000 grams cow's milk; numbers 1 and 3 are higher. In 1000 grams woman's milk Bunge found 2.8 and 4.2 milligrams of iron. Winter Blyth gives an analysis of oatmeal in which 1.4 milligrams of iron were found in 100 grams, which is about one-half only of what my analysis gave. No doubt the quantity of iron must differ considerably in different specimens of the same substance, as it must depend greatly on the quantity of the metal present in the soil or in the organism and available for use. The amount found in beefsteak will depend very greatly on the extent to which the animal has been bled.

"The quantity of iron in the daily dietary of healthy persons with good appetite averages therefore from 8 to 10 or 11 milligrams, while those who eat less ingest about 6 to 8 milligrams per day. Four or five pints of sweet milk daily suffice to maintain an adult in health, and this amount, according to the above analysis, would contain about from 6 to 10 milligrams of iron, while the convalescent diet of the Royal Infirmary, which is certainly a sufficient maintenance for persons leading a somewhat inactive life, furnishes 6 milligrams of iron per day.

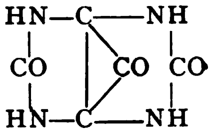
"The iron metabolism of the body must therefore be small, very little of the metal can be excreted, and the great bulk must be retained in the body and utilized over and over again. It has now been established that only about 1 milligram is excreted daily in the human urine, while the amount in the bile of dogs is only about ¾ of a milligram. How much is excreted under normal conditions by the intestinal mucous membrane, in shed epithelium and in other ways, it is impossible to determine, but the daily total excreted by all channels must be extremely small and is probably well under 6 milligrams. Cetti, during a ten days' fast, excreted an average of 7 milligrams of iron per day in his fæces, and Breithaupt, during a six days' fast, an average of 8 milligrams, but the condition of fasting is peculiar and may conceivably cause an abnormal drain on the blood-corpuscles as well as on the other tissues. The 6 to 10 milligrams of iron present in a sufficient dietary certainly suffices to supply the physiological needs of the body and to keep the individual in good health. It seems certain that when the red blood-corpuscles break down, although their pigment is to a large extent excreted in the bile and urine, yet their iron must be retained very largely in the liver and spleen, where it is stored and gradually utilized as required for the formation of new red corpuscles."

NOTES FROM GERMANY.

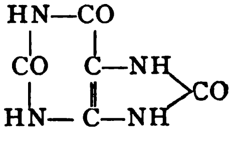
By Lafayette B. Mendel, Ph.D.,

BRESLAU.

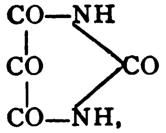
Uric acid was discovered in the urine of man as early as 1776, by Scheele. The synthesis of this substance—a problem which chemists had attempted to solve for many years—was first accomplished by Horbaczewski in 1882. Long before this, however, the distinguished chemists Wöhler and Liebig (1838) and Baeyer (1863-4) had thrown considerable light upon the probable constitution of uric acid by their investigations of its decomposition products. By oxidation and hydrolytic cleavage. uric acid will yield urea and oxalic acid, and this decomposition may pass through a variety of stages, according to the method of oxidation. The data thus obtained gave rise to a variety of speculations regarding the structure of uric acid. it was regarded, on the one hand, as a complex derivative of cyanamide ($CN.NH_2$); on the other, as a derivative of urea ($CO.(NH_2)_2$). A number of formulæ were suggested, among others that of Fittig:



and of Medicus (1875):



The latter best explains the various reactions of uric acid, and is, moreover, at present universally accepted as the outcome of the investigations of Emil Fischer (1884). He showed that uric acid contains four imide (NH) groups, since it can be converted into tetra-methyluric acid. Furthermore, by varying the conditions of experiment it is possible to obtain two isomeric monomethyl derivatives, one of which yields, on oxidation, methylurea and alloxan



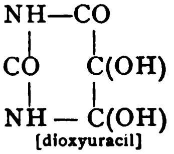
and the other methyl-alloxan and urea. Accordingly, the four imide groups of uric acid cannot be equivalent, and the formula of Fittig is thus excluded.

Horbaczewski synthesized uric acid in several ways, of which the most interesting follow:

$$3\underset{\text{[urea]}}{CO(NH_2)_2} + \underset{\text{[glycocoll]}}{CH_2.NH_2.COOH} = \underset{\text{[uric acid]}}{C_5H_4N_4O_3} + 3NH_3 + 2H_2O$$

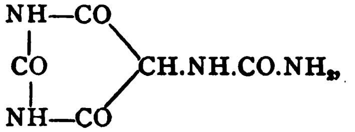
$$2\underset{\text{[urea]}}{CO(NH_2)_2} + \underset{\text{[trichlorlactamid]}}{C_3Cl_3O_2H_2.NH_2} = \underset{\text{[uric acid]}}{C_5H_4N_4O_3} + H_2O + NH_4Cl + 2HCl$$

A more interesting and easily effected synthesis is that of Behrend and Roosen (1888):

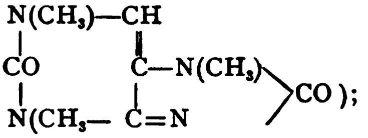


$$\underset{\text{[dioxyuracil]}}{\begin{array}{l} NH-CO \\ CO\quad C(OH) \\ NH-C(OH) \end{array}} + \underset{\text{[urea]}}{CO(NH_2)_2} = \underset{\text{[uric acid]}}{C_5H_4N_4O_3} + 2H_2O$$

Recently, the synthesis has been accomplished by Emil Fischer and Lorenz Ach.[*] They obtained uric acid by removing one molecule of water from pseudouric acid :



a compound which Schlieper and Baeyer had already obtained (1863) from potassium cyanate and uramil. Without giving the details of the reactions, it is most interesting to note that uric acid can in this way readily be built up from urea and malonic acid ($CH_2.(COOH)_2$). Fischer and Ach further prepared various methyl derivatives of uric acid. Starting from dimethyluric acid, Fischer[†] accomplished the synthesis of caffeïn (trimethylxanthin,



and from brom-theobromin (brom-dimethylxanthin) he obtained in turn dimethyluric acid. This distinguished investigator, to whom synthetic chemistry already owes so much, has thus succeeded in experimentally demonstrating the long and eagerly sought connection between the xanthin group and uric acid.

To the xanthin group belong caffeïn, theobromin, hypoxanthin, guanin, and adenin—all substances of considerable interest physiologically, and some of which are especially important as decomposition products of the nucleins. It has long been known that uric acid, when ingested, appears as urea in the urine. The uric acid regularly found in this excretion must, therefore, have its origin in the body. Horbaczewski considers it a product of the decomposition of the nuclei of dying tissue-cells. It may be formed by the oxidation of the xanthin bases, or may arise directly from the nuclein substances, when oxidation has preceded the cleavage. Thus by arranging an artificial circulation of blood through various organs, Horbaczewski found that the latter regularly yielded xanthin bases and uric acid to the blood; and this occurred the more or less abundantly in proportion to the richness of the tissue in nuclei. Accordingly the spleen gave comparatively large yields. When the blood circulating was kept arterial by sufficient oxygen, the uric acid preponderated; with venous blood xanthin bases alone were produced.

The ingestion of nuclein prepared from spleen pulp is followed by an increased excretion of uric acid. According to Horbaczewski this is not due to the nuclein itself, but to resulting leucocytosis. The uric acid formed would thus owe its origin to the nuclein of the disintegrating leucocytes. The richer the blood becomes in the latter, therefore, the greater should be the output of uric acid. As a matter of fact, leukæmia, during which the uric acid of the urine is largely increased, is characterized by an abnormal number of leucocytes in the blood. Moreover, various therapeutic agents which increase the number of leucocytes in the blood also increase the excretion of uric acid. As to specific organs in which uric-acid formation occurs in the body, we have little definite knowledge at present.

It has long been shown that the intestinal juice possesses the power of inverting cane-sugar, and Paschutin's discovery that the intestinal mucous membrane contains an inverting enzyme has been abundantly verified. Brown and Heron later demonstrated that the mucous membrane of the small intestine is able to convert maltose also into grape-sugar. Röhmann and Lappe[*] have recently investigated the influence of the small intestine on milk-sugar (lactose). They find that the intestinal mucous membrane of the calf and the dog (both young and full-grown) can transform lactose into dextrose. Experiments with ox-intestine gave negative results. Pautz and Vogel[†] also noted that the intestine of a newly born child was able to convert milk-sugar into dextrose. These observations add interesting facts to our knowledge of the function of the intestinal mucous membrane and the intestinal juice. Maltose, the chief end-product in the digestion of starch by the amylolytic enzymes of the body, saccharose and lactose, which form important elements in our diet, are all disaccharides. The sugar of the blood is probably a monosaccharide (dextrose). All sugars that are disaccharides are therefore probably converted into monosaccharides before or during absorption from the alimentary canal. They pass, for the most part, into the blood of the portal circulation and so to the liver. The enzyme long known to be present in the latter organ was shown by Miss M. C. Tebb[*] to be capable of transforming starch and glycogen into dextrose. A similar transformation is accomplished by the amylolytic enzyme present in the blood-plasma and lymph.

---

[*] *Berichte der deutschen chem. Gesellsch.*, xxviii., 2473 (1895).

[†] Ibid., xxviii., 2480 (1895).

[*] *Berichte der deutschen chem. Gesellsch.*, xxviii., 2506.

[†] *Zeitschrift für Biologie*, 1895.

By the death of Professor Felix Hoppe-Seyler, Germany has lost a distinguished teacher and one of the foremost investigators in the domain of physiological chemistry. Prof. Hoppe-Seyler, although in his seventieth year, was active in the work of research until the end. He acquired the foundations of his biological training under the Webers, Erdmann, and Lehmann, at Leipzig. After a brief career as a practising physician, during which he published several studies on physical diagnosis, he accepted, in 1854, the position of prosector at Greifswald, and thence was called to Berlin as director of the chemical laboratory of Virchow's Institute. It was here that the first edition of his "Handbuch der physiologischen und pathologischen Analyse" was written. From 1867 to 1871 Hoppe-Seyler was professor in Tübingen, and in 1872 was called to the independent chair of physiological chemistry in the new German University at Strassburg. From the Strassburg laboratory many men have gone forth whose names are well known in the field of physiological chemistry and medicine.

Of Hoppe-Seyler's more important researches there may be mentioned those on hæmoglobin and its derivatives, on fermentation and putrefaction, on the oxidation processes in the animal body, on the composition of various secretions and tissues, on the chemistry of protoplasma, and on chlorophyll. In 1877 he founded the *Zeitschrift für physiologische Chemie*, in which many important contributions have appeared, and which has already reached a goodly number of volumes. Only shortly before his death the main responsibility of editing the *Zeitschrift* was transferred to two of Hoppe-Seyler's most distinguished pupils, Professor Baumann, of Freiburg, and Professor Kossel, of Marburg. To further the universal recognition of physiological chemistry as an independent science was one of the aims which characterized Hoppe-Seyler's efforts. It is earnestly to be hoped that the reforms which the noted investigator initiated in this direction may be retained and extended.

INFANTILE SCURVY FROM STERILIZED MILK.

By Louis Starr, M.D.,

PHILADELPHIA.

Sterilization of milk, or, in other words, its prolonged subjection, under pressure, to a temperature above the boiling point of water, while undoubtedly a process of great value, is neither so universally applicable in the preparation of food for infants nor so free from disadvantages as was supposed at the time of its original introduction. The same prolonged and intense heating that destroys the bacteria in the fluid and prevents its acting as a medium in transmitting zymotic diseases, that adapts it to the treatment of various gastro-intestinal disorders, and that preserves it for a long time in an aseptic and administrable condition, produces changes in certain constituent elements of the milk that interfere with easy digestion, and in this way make it a less perfect and nutritive food. These changes occur especially in the lactalbumin, which has its solubility diminished, and in the fat globules, which are made to coalesce with each other and with some of the insoluble albuminous matter.*

---

[*] *Cambr. Phil. Soc.*, viii., 199.

Among artificially fed infants, particularly those belonging to the wealthier classes where the surroundings are most favorable and the supply of cow's milk as nearly perfect as possible, one encounters cases of malnutrition verging even upon simple atrophy, which are due solely to sterilization of the food, a fact readily established by the rapid improvement following the use of identically the same milk mixtures either Pasteurized or untreated by heat. In my opinion the alterations produced in cow's milk by sterilization may also lead to the development of the complex of symptoms known as infantile scurvy, but as this point has been disputed it is a matter of interest and importance to place upon record the following cases that have come under my personal observation during the past two years.

Walter, the child of a clergyman living in an excellent house at Chestnut Hill, one of the healthiest suburbs of Philadelphia, was seen in consultation with Dr. R. H. Bolling. The little patient's parents were perfectly healthy, as were also several older brothers and sisters. He had been fed artificially from birth, the food being a mixture of sterilized milk and water in the proportion, at first, of one-third, then one-half, and next two-thirds, with two teaspoonfuls and a half of cream and one teaspoonful of sugar to each six-ounce bottle. He apparently thrived until the age of eight months, when the symptoms of scurvy appeared; namely, spongy and bleeding gums, pain in and immobility of the legs, and some swelling above the knee- and ankle-joints.

At the date of my visit, about three weeks after the beginning of the attack, the infant, while pale, was sufficiently well grown and fleshy; four teeth were cut and there were absolutely no symptoms of rickets. Both legs were passive, but not in the least paralytic. Picking up the child or any attempt at moving or palpating the limbs caused violent screaming. There was slight fusiform swelling at the lower third of each thigh and above each ankle; these regions were extremely tender to the touch, but the skin was normal in appearance. The gum in proximity to the erupted teeth was greatly swollen, overlapped the teeth, bled upon the slightest touch, and was livid-purple in hue. The appetite was fairly good, the bowels were regular, and beyond restlessness, fretfulness, and disturbed sleep there were no further symptoms of illness.

The treatment adopted was discontinuance of sterilization without alteration in the composition of the milk-food, the administration of a teaspoonful of orange-juice and the same quantity of raw-beef juice three times daily, and small doses of citrate of iron. Result, complete recovery in a little over three weeks.

Donald, a second child, born of healthy parents and in comfortable surroundings, presented the first symptoms of scurvy at the age of ten months. The first child had succumbed to a chronic wasting disease (probably tubercular), and this little patient had been carried through the earlier months of his life only by the skilful care of Dr. W. A. Carey, by whom I was called in consultation and to whom I am indebted for the clinical notes.

He had been bottle-fed from the first week after birth. Up to the fourth month a condensed-milk mixture was employed; then he was placed upon a sterilized mixture of cow's milk, cream, lime-water, and sugar-of-milk. At the date of onset of the scorbutic symptoms he was taking every three hours a sterilized food composed of the above ingredients in the following proportions: cream, f℥iss.; milk, f j.; water, f℥iij.; lime-water, f℥ss.; sugar-of-milk, ʒj. The initial symptoms were fretfulness, disturbed sleep, slight feverishness, and violent paroxysms of crying when picked up in the arms, or when the legs were moved or pressure made about the hips or knee-joints. These joints were not perceptibly swollen nor was there redness or other discoloration of the surface. The gums, however, of both the upper and lower jaw in the neighborhood of the two lower and four upper incisors, which were well advanced, were swollen and of a "deep raw-meat color." This discoloration decreased after a short time to a purplish line limited to the margin of the gums.

---

* Leeds: "American Text-Book of the Diseases of Children," p. 48.

At the time of the consultation, about ten weeks after the beginning of the attack, there was little change in the symptoms. The child was moderately well nourished considering the difficulty that had been experienced in feeding him throughout his life. Dentition was normally advanced and there were no rachitic manifestations. The margins of the gums corresponding to the teeth that were cut were moderately swollen and distinctly purple in color. There was marked pain on moving the legs, tenderness on handling the hip- and knee-joints, and a slight swelling above each knee. The tongue was quite clean, the appetite fairly good, and the bowel action regular. Physical examination of the chest and abdomen gave negative results. The urine was high-colored, but otherwise normal.

In treating the case no change was made in the composition of the food, but Pasteurization was substituted for sterilization in its preparation, and in addition two teaspoonfuls of raw beef-juice and from one to two teaspoonfuls of orange-juice were ordered every four hours. The patient began to improve immediately, eating better, gaining in weight, and sleeping well. All scorbutic symptoms disappeared in less than three weeks.

Elizabeth, the third child of healthy, well-to-do parents living in the country, exhibited the first symptoms of scurvy at the age of seven months. Her brother and sister were delicate, the latter especially, having suffered from several severe attacks of gastro-intestinal disorder. The little patient herself had never been robust, and her feeding—artificial by necessity from birth—had been difficult to manage. For the first five months the food employed was a sterilized mixture consisting of milk, four parts; cream, six parts; water, twenty parts; lime-water, two parts, and milk-sugar. On this she gained flesh and strength so slowly that a gradual increase in the proportion of milk was attempted, but, as disturbed digestion immediately ensued, no further efforts were made in this direction. Mellin's food was then added, with no better results.

At seven months a slight decrease in the activity of the leg movements was observed. Then pain, evinced by crying, was noticed on moving the limbs; this gradually increased until the slightest movement or touch caused suffering. The parts in the neighborhood of both knees and the left ankle were the most tender, though there was no swelling, heat, nor redness of the skin. These symptoms improved under the use of tonics and salicylate of sodium, to return again shortly after with the impaired digestion and general debility which followed in the wake of a moderately severe attack of measles. Again the tonic treatment was resorted to with success, but as the digestive powers remained very feeble, it was found impossible to administer food (sterilized) of proper nutritive strength, and the painful condition of the legs soon reappeared.

It was in this stage of the case, after a course extending nearly three months, during which sterilization had been constantly employed in the preparation of the food, that I saw the patient through the kindness of Dr. Joseph Stokes, of Moorestown, N. J., to whom I am indebted for the above clinical data. The child was pale, poorly nourished, and feeble. The appetite was poor, the bowels were in fairly good condition, though an occasional evacuation showed mucus and undigested milk-curds. The tongue was lightly coated, and the gums, at the position of the two lower incisors, which were thoroughly advanced, were swollen and purple in color. Both legs were passive; attempts at movement caused severe pain, and pressure above the knee- and ankle-joints showed extreme tenderness. There was no swelling, and neither heat nor discoloration of the surface. Examination of the heart, lungs, and abdomen gave negative results, and the urine was normal. There were no indications of rickets.

Immediate discontinuance of sterilization was recommended, and the child was ordered a partially pre-digested food, composed of cream, one-half fluid ounce; milk and water, each three fluid ounces; peptogenic milk-powder, one drachm. In addition to this, one teaspoonful of raw beef-juice and a bitter tonic were given three times daily.

The scorbutic symptoms disappeared rapidly, there was a corresponding gain in general strength and digestive power, and in a few weeks the patient was well.

Not to go further into detail, I have seen in consultation during the past eighteen months five cases of scurvy in children aged eighteen, twenty, twenty-two, sixteen, and fourteen months respectively, which illustrate the etiological point in question. In each of these cases the food was properly proportioned and had for its basis sound cow's milk, but sterilization had been uniformly employed in its preparation. All recovered rapidly upon the same food unsterilized, with the addition of a small quantity of raw beef-juice and orange-juice to the diet.—*Amer. Jour. Med. Sciences.*

ON THE INFLUENCE OF THE USE OF SUGAR ON MUSCULAR WORK.*

By Professor B. T. Stokvis, M.D., LL.D.,

AMSTERDAM.

The influence of sugar on muscular work is so very important from a physiological, a dietetic, an economical, and a social point of view, that I was anxious to repeat in the Pathological Laboratory of Amsterdam the well-known experiments of Professor U. Mosso and Dr. V. Harley. I invited my pupil, Dr. Langemeyer, to examine this question in view of his inaugural dissertation, and the results he arrived at by a long-continued and skilful examination I now take the liberty to communicate to this section.

Professor Angelo Mosso's ergograph is so well known that it seems quite superfluous to give a description of this ingenious instrument, by means of which the total amount of work done by the muscles of the middle finger in lifting a fixed weight till fatigue set in can be measured exactly, and the time during which the muscular work is done can be determined most easily. It is also known that if the separate experiments with the ergograph are repeated too frequently, exhaustion may follow to such an extent that the whole ergographic work is reduced to a minimum and no further work can be done.

Now Professor U. Mosso and Dr. Pavletti found that in this period sugar taken in not too great quantities, and not too concentrated, was able to lessen the fatigue so that a further rather considerable amount of muscular work could be done. On the other hand, Dr. Vaughan Harley stated that a great quantity of sugar taken in addition to the ordinary food increases the amount of muscular work in a most evident manner. The result of the publication of these researches was that the question is now often considered as decided, and that already in popular papers and journals the wages and food of workmen are treated as if the beneficial effect of the use of sugar on muscular work were a well-established scientific fact. Now Dr. Langemeyer's experiments prove that this beneficial effect does not exist, or if it does exist at all can in no way be demonstrated by the ergograph. In his first series of experiments, which are to be considered as preliminary, ergographic work was done twice a day by Dr. Langemeyer and the assistant of the Pathological Laboratory, Dr. Lechensen, with the left and the right hand over a period of eight weeks, in order to find out the physiological variations occurring during a regular mode of life in respect to different hours of the day, to different individuals, to different days, etc. We shall have afterward to return to the results of this series of experiments.

In the second series of experiments different kinds of sugar—sweet-tasting and not sweet-tasting (cane-sugar, grape-sugar, milk-sugar), and sweet-tasting substances not belonging to the carbohydrate group, for example, saccharin and dulcin—were taken before doing ergographic work, in order to ascertain if the beneficial effect of sugar should be considered as the effect of a palatable condiment, and due to the excitation of the nervous system produced thereby, or as the effect of a muscular food.

---

* Read in the Section of Physiology at the annual meeting of the British Medical Association, held in London, July-August, 1895.

The result of these experiments was, in reference to the researches of Dr. Harley, which we believed quite exact up to that time, a most unexpected one. In none of the experiments was there any evidence of a beneficial effect of the use of sugar or sweet-tasting substances on the ergographic work. I have here in view the general conclusion of this series of experiments that lasted over forty days, not the conclusions which could be drawn from one single experiment, for it happened often that the amount of ergographic work was greater after taking sugar or milk-sugar or saccharin, but as often the amount of work was diminished, and in many experiments the right hand was the only one which had gained, whereas the left had lost. Yet the total amount of ergographic work done in this series showed a real and marked increase in reference to the total amount of work of the first series, but as this increase was a gradual one independent of the substances that were taken, it was most natural to consider it as a simple effect of training. And so, indeed, it proved, for when for a control the experiments were pursued daily during more than a fortnight in exactly the same way, but without taking any sugar or palatable sweet condiment at all, the amount of muscular work still showed the same gradual increase, so it became obvious that the normal course of training is in no way influenced by the use of sugar.

The third series of experiments was perhaps the most interesting of all. In according with the experiments of Prof. Ugolino Mosso and his pupils, the effect of the use of sugar on almost exhausted muscles was examined in this series. It is not so easy as it seems to provoke exhaustion of the muscles engaged in ergographic work by often repeated single experiments. Even if the successive experiments done with the same hand follow each other with full speed, say after six minutes, and the weight to be lifted is a heavy one, that is six to seven kilograms (ordinary work is done with three kilograms), the amount of muscular work done by trained persons still represents, after two or three hours of working, one-fourth or one-fifth of the work done in the beginning. These experiments lasted from five to six weeks, and were made with four different individuals. One of them, a tall, well-grown lad of sixteen years, who did not understand in the least what the experiments meant, was the only one who exhibited in the beginning of the experiments all the peculiarities of real exhaustion. After sixteen or seventeen single experiments he could not do more ergographic work. Of all, he was the most fit subject for demonstrating the beneficial effect of sugar on the exhausted muscle. Yet in his case, as in all the others, the alleged beneficial effect failed completely, at least in the first weeks, for in later weeks, training still being continued, it happened from time to time that this boy, as well as another untrained young man, after exhaustion seemed to have set in exhibited most unexpectedly a great gain of muscular work. Once there was a gain of 3 kilogram-metres without anything being eaten; another time there was a gain of 2 kilogram-metres after the use of sugar; and finally, an extraordinary gain of 18 kilogram-metres was found after a draught of fresh water. Without being able to decide the question whether these variations are to be considered as a mere accident or as a consequence of training, it is obvious that reliable results could not be obtained by experiments of that kind in untrained individuals. And in regard to the trained ones who took part in these experiments, I can only repeat that no effect whatsoever of the use of sugar was seen on their exhausted muscles.

In the second and third series of Dr. Langemeyer's experiments the doses of sugar were moderate ones. In his fourth and last series, large doses were taken in order to examine their influence on the non-exhausted muscle, as in the experiments of Dr. Vaughan Harley. As the physiological variations between different days had proved greater than the variations between morning and afternoon of the same day, Dr. Langemeyer compared the ergographical work done in the morning with that performed in the afternoon, after having taken with his luncheon at 12 o'clock 100 or 200 grams of sugar in addition to his ordinary meal. The experiments with 200 grams of sugar lasted 17 days, the experiments with 100 grams 11 days. [Professor Stokvis gives here two large tables of the results, which we omit, as they are purely negative in character.—Ed.]

As is easily seen, there is in these experiments no question of a marked influence of the use of sugar on muscular work. The difference between the work done in the morning and that done in the afternoon after the use of sugar is so very slight that it is of no value at all; and it is very remarkable that notwithstanding the use of almost four kilograms of sugar the amount of ergographic work as a whole in this series is even inferior to that obtained in the beginning of the experiments in the period of a strong training.

As a final experiment the amount of daily ergographic work taken every hour from 9:30 till 5:30 was noted, a separate tracing with each hand being taken on days on which 250 grams of sugar were taken in four equal portions—at 9, at 11, at 1, and at 3 o'clock—in addition to the ordinary diet, all other conditions remaining the same. On comparing the total amount of work on the sugar days with that obtained on the non-sugar days, the sugar days give as the total time during which the weight was lifted, 1 hour and 48 minutes, with a work of 302 kilogram-metres; the non-sugar days, 2 hours and 8 minutes, with a work of 354.028, that is, a difference of 20 minutes and 52 kilogram-metres in favor of the non-sugar days. It is interesting to note that these differences in favor of the non-sugar days are not to be considered as an average result, but that each separate day and each separate hand shows these differences in the same sense, as is easily seen in the following table:

TABLE SHOWING THE AMOUNT OF ERGOGRAPHIC WORK DONE BY THE RIGHT HAND ON DAYS WHEREON SUGAR (250 GRAMS) WAS TAKEN, AND ON DAYS WITHOUT SUGAR.

Date.	250 Grams Sugar.		Date.	No Sugar	
	Time during Weight Lifted.	Total Work.		Time during Weight Lifted.	Total Work.
	Seconds.	Kilo.-metres.		Seconds.	Kilo.-metres.
April 29.	1046	44.996	April 30..	1223	59.732
May 1...	1146	52.618	May 2....	1162	56.188
May 3...	1130	49.872	May 4....	1098	52.720
Total...	......	147.486	Total...	......	168.640

TABLE SHOWING THE AMOUNT OF ERGOGRAPHIC WORK DONE BY THE LEFT HAND ON DAYS WHEREON SUGAR (250 GRAMS) WAS TAKEN, AND ON DAYS WITHOUT SUGAR.

Date	250 Grams Sugar.		Date.	No Sugar.	
	Time during Weight Lifted.	Total Work.		Time during Weight Lifted.	Total Work.
	Seconds.	Kilo.-metres.		Seconds.	Kilo.-metres.
April 29.	1216	42.104	April 30.	1808	62.784
May 1...	1306	57.516	May 2...	1334	59.716
May 3...	1250	55.058	May 4...	1350	62.888
Total...	......	154.628	Total...	......	185.388

The divergence between Dr. Langemeyer's results and those of his predecessors is as striking as possible. How is it to be explained? I venture to state that it can be fairly explained by regarding the different factors which may influence the amount of ergographic work. In Langemeyer's researches everything was done to avoid as completely as possible all psychical influences by placing a low screen between the operator and the registering apparatus, so that the height to which the weight was lifted could not be seen by him. In the second place, Langemeyer succeeded, after a long time of preliminary work, in insuring an equal method of working during the whole series of experiments. To this end it is first necessary to fasten the arm in the instrument as tightly as possible, so that no other movement than that of the middle finger can be registered; but secondly, it is still more important that in each separate experiment there should be a perfect equality in regard to the time in which each contraction and relaxation of the finger takes place; and thirdly, in regard to the way in which the finger is moved. In regard to the time, it is obvious that the setting in movement and the relaxation of the finger even in an interval of two seconds can take place rapidly or rather slowly. In the first case the interval between each muscle contraction must be greater than in the second. Now in respect to fatigue—and all ergographic work is work till fatigue sets in—it is of course retarded by contracting the finger rapidly and letting it fall immediately after contraction, whereas moderately slow contractions and relaxations tend to induce fatigue more quickly. Therefore, after the first weeks of preliminary experiments it was arranged that the contraction and the relaxation should take place as a rule as slowly as possible at intervals of two seconds.

It was most necessary to do so, because some persons very soon get accustomed to rapid contraction and relaxation, and thus become able to perform ergographic work six to ten times in excess of the usual work without inducing more than the ordinary exhaustion.

Former experimenters have also drawn their attention to this point, for Professor A. Mosso spoke of it in his first communication; but is it not most remarkable that in none of the papers on the use of sugar and its influence on muscular work this important factor is not alluded to? It is just the same with the influence of training, which, too, is never mentioned.

In regard to the third point, viz., the way in which the finger is moved and the way it is lifted, Dr. Langemeyer found that the ergographic work can be done in three ways—either by the contraction of the flexor profundus, or by the contraction of the flexor sublimis, or by contraction of the two muscles at the same time. Contraction of the flexor profundus alone produces flexion of the finger, contraction of the sublimis alone elevation without flexion, as is easily demonstrated by mechanical pulling of the tendons of these muscles in the cadaver.

In the living subject ergographic work is usually done, and should be done, by the cooperation of these two muscles, yet a separate voluntary contraction of each of the two muscles can be easily obtained by training in such a way that in performing ergographic work one muscle can take the place of the other, and contraction of one is immediately followed by contraction of the other.

In this way the setting in of fatigue is again considerably retarded, and ergographic work can be performed to an amount which may many times surpass the usual work done by the simultaneous contraction of the two muscles. Ergographic work includes, therefore, many sources of error, and although I dare not say that Dr. Langemeyer's predecessors paid no heed to them, yet I am fairly persuaded that the different ways in which ergographic work can be done explain to a great extent the divergence between his results and those of former experimenters.

There is yet another point to be observed. In his preliminary experiments Dr. Langemeyer had at his disposal a great number of observations, which enabled him to be acquainted with the daily variations of the work performed under normal conditions of life. These daily variations proved, especially in the beginning of the experiments, before a real and thorough training was obtained, as great or greater than the variations which Dr. Harley considers as a gain caused by the use of sugar. In Dr. Harley's experiments, the gain in time during which the weight was lifted was, in thirty separate tracings, 519 seconds; that is, an average for one separate tracing of 17.3 seconds. Dr. Langemeyer found for himself and for Dr. Lechensen normal variations running up to 25 seconds. The gain in work was in forty separate tracings by Dr. Harley 41.938 kilogram-metres, an average of 1.3 for one separate tracing. Dr. Langemeyer found a normal variation in the beginning of his experiments of 1½ kilogram-metres and more.

To conclude, I do not hesitate to say that till now there has not been given any experimental proof of the beneficial effect of sugar on muscular work. This conclusion is not an unexpected one. Physiology teaches us that muscle is not only a most admirable living engine, in which chemical energy is transformed into mechanical work, as was so well explained last winter by my honored friend and colleague, Professor Engelmann, of Utrecht, in his Croonian Lecture, but that it is, at the same time, a great storehouse of chemical substances able to develop chemical energy. The assimilation of these chemical substances and their storage by the muscle go on so very slowly that an immediate influence of the ingestion of food on the amount of work done by the engine is not to be expected. Manca's experiments and the experience of daily life teach us that even a long total abstinence from food is not able to diminish the amount of muscular power to any appreciable extent; for in muscle we have to deal with an exceedingly well-provided storehouse, and with an engine working at so little expense that 80 milligrams of sugar (glucose) are sufficient to produce an ergographic result of more than 100 kilogram-metres. In healthy persons fatigue and exhaustion, therefore, are never caused by want of food, but solely and exclusively by want of rest; and although it cannot be contended that the chemical energy produced by the combustion of sugar is one of the chief sources of muscular work, yet there is no plausible reason why, in order to promote muscular work, sugars should be added to the daily food. All other carbohydrates will do as well for the provision of the muscular storehouse with the necessary stock of chemical energy.—*Brit. Med. Jour.*

DIETETICS IN GASTRIC DISEASES.

By Philip Elkin, M.D.,

OF PITTSBURG, PA.

The means employed to combat diseases of the gastric apparatus may be summarized under three headings—dietetic, mechanic, and medicinal. Of these the dietetic are of primary importance. Nearly all pathologic states of the stomach imply a disturbance in either its motor, resorptive, or secretory function, or a combination of these. In the first and second it is usually in the direction of retardation; in the third we find diminished and heightened activity of the glandular apparatus of the stomach to be of equal frequency of occurrence. All abnormalities in the chemification of the food can be traced to either one of the preceding factors or a combination of them.

Wherever there is an inhibition of the motor power of the stomach, whether due to mere functional adynamia, as in atony, or to structural changes, as in dilatation or carcinoma ventriculi, the same principles of alimentation obtain, modified, of course, by the various chemic conditions present, as well as certain etiologic considerations. In this condition a restriction of the quantity of liquids and adherence to a solid diet mainly are indicated. Liquids in any considerable quantity further the relaxation of the stomach: 1, By their dead weight alone. 2, They do not furnish anything tangible on which the walls of the stomach can contract, as in the case of solids. 3, By their very fluidity they fail to make that impact upon the nerve-filaments of the mucous membrane which is so necessary for the production of peristalsis.

It is especially in dilatation, in which the resorptive function of the stomach suffers such marked impairment, that a strict adherence to the preceding principle becomes imperative. As corollaries of this principle must be added the consistence and preparation of the food, which must be such as not to be incompatible with tolerably easy digestion. As retardation in the motor function of the stomach is usually associated with alterations in the gastric secretion, the selection of a suitable regimen in any given case will have to be modified to meet the chemic conditions.

As a rule, whenever there is an appreciable retardation of the peristaltic function of the stomach we shall find also a concomitant diminution in the production of both free and combined hydrochloric acid. There is, however, one marked exception to this rule, namely, dilatation either idiopathic or due to stenosis of non-malignant origin, as, for instance, in constricting cicatrices of healed ulcers. In these cases we will generally find a marked increase in the production of the normal acid elements of the gastric juice. In several cases of benign dilatation that have come under my observation, I found a percentage of 120 with $\frac{1}{10}$ normal alkaline solution, or somewhat more that twice as much as usually obtains in normal gastric secretion.

Again, we may have very marked hypersecretion in gastric disturbance of nervous origin, when there is present very little or no retardation of the motor function.

As the motor and resorptive phenomena of gastric digestion furnish us with the first principle laid down, which, for convenience' sake, may be called the physical principle of dietetics, in the same way the chemic phenomena of digestion furnish us with a second fundamental principle in dietetics, which may be called the chemic principle. This second principle may be roughly stated as follows: The administration of the albuminous, starchy, and saccharine articles of diet is to be regulated by the quantity of hydrochloric acid and ferments which the examination of the gastric contents reveals.

In the application of these two fundamental principles of dietetics, let us first consider those conditions characterized by a diminution in the production of hydrochloric acid and ferments and retardation of the motor function. To this group belong acute gastritis (frequently), chronic gastritis, certain forms of nervous dyspepsia, carcinoma ventriculi, and atony.

By selecting one of these conditions as a type for all, we may construct a paradigm of treatment which, with some slight inflections to meet certain conditions obtaining in each, we can apply with tolerable accuracy to all. Of the whole group, chronic gastritis offers by far the largest field for instruction in respect to dietetics.

The dietetics of chronic gastritis. Whenever there is manifested a disposition to repeated attacks of acute gastritis, the condition known as chronic gastritis ultimately sets in. As chronic gastritis is associated with a progressive change in the interstitial elements of the stomach and a diminution in the acid and peptonizing elements of the gastric juice, which progress *pari passu* with the interstitial changes, our dietetics should conform to the degree of chronicity attained by the disease.

In the very first onset of chronic gastritis, when the disturbances in the functions of the stomach are slight, any considerable departure from the normal rule of diet is unnecessary. When, however, flatulence, eructations, a sense of weight and pressure, diminution of appetite, a disinclination for meat and other albuminous articles of diet denote a lessened activity in the secretory and motor functions of the stomach, the moment has supervened when it becomes necessary to contract the promiscuity of the ordinary bill of fare into narrower limits. The symptoms, both subjective and objective, and especially the examination of the gastric contents, must guide us in our choice of a suitable regimen.

When there is any appreciable diminution in the quantity of free and combined hydrochloric acid, together with diminished activity of the rennet-principle, as evinced in the slower and inefficient coagulation of milk to which a few drops of the gastric juice have been added, the careful selection and preparation of the albuminous articles of food are indicated.

In testing for rennet, we best proceed by adding a few drops of the filtered gastric contents to about 5 c.c. of milk and setting aside the same in a thermostat at a temperature of about 100° F. If rennet be present, the characteristic coagulation will supervene in ten or fifteen minutes,

In the choice of animal food it is best to avoid those tough and fibrous varieties of beef that require a longer period for their disintegration. For this reason also "smoked" articles of food should be eschewed. Our choice should be restricted to calves' brains, sweetbread, the more tender parts of the beef, boiled ham, boiled tongue, hare, chicken, fish, and oysters, as requiring less time for their digestion. Eggs in any form are also suitable.

The preparation of the food is a nice point in dietetics. As a rule, boiled, baked, and stewed meats require less time for their digestion than when fried. As to the hydrocarbons (vegetables and farinaceous articles of food), those containing the least proportion of cellulose, and consequently leaving little or no residuum after digestion, are to be preferred. Potatoes, cauliflower, peas, turnips, wheat-bread, rice, and spinach should receive preference. Cabbage and celery should be eschewed; likewise raw fruits, apples, pears, etc.

In the advanced stages of chronic gastritis, when there is marked change in the interstitial elements of the stomach, causing a partial obliteration of the glandular elements, with a concomitant diminution in the production of the hydrochloric acid and ferments, the most careful preparation of the food is imperative. In this stage the inclination of the patient will lean toward the farinaceous articles of food. Vegetables, such as potatoes, carrots, spinach, etc., should be eaten in the form of *purée*.

As in this stage the stomach responds but feebly in the digestion of animal food, the most careful selection and preparation in this respect are indicated. Beef especially, if partaken of, should be chopped or hashed.

Patients with chronic gastritis manifest a desire for hot and piquant condiments, such as pepper, mustard, pickles, etc. As these articles only serve to irritate the mucous membrane, no more than a very moderate indulgence in them is permissible. On the other hand, a liberal quantity of salt is indicated, as it furnishes the material out of which the gastric juice is elaborated, and thus contributes to the formation of hydrochloric acid, of which there is such a lack in chronic gastritis.

In order to guard against the possible denutrition that may occur, owing to the marked disinclination of the patient for albuminous articles of diet, we would do well to include in our regimen such vegetables as peas, beans, and lentils, which contain a large percentage of leguminose (vegetable albumin).*

This scheme of diet for chronic gastritis will amply satisfy all the demands to be filled in cases of atony. As in atony there is very little curtailment in the production of the gastric juice, we may abate somewhat the severe restrictions which in advanced stages of chronic gastritis we place upon the albuminous elements of diet.

In cases of acute gastritis the let-alone principle is the best; a two or three days' rest for the overtaxed organ is all that is required to meet the conditions.

A word may be said here respecting the inhibition of the gastric functions of nervous origin. As a rule, any attempt on the part of the physician to erase the discomforts of the patient suffering from nervous dyspepsia by the regulation of the diet, will prove unavailing. It is surprising in these cases how the heaviest articles of diet are borne without the slightest discomfort, when the lighter articles of food, even milk, will be intolerable. The best rule of dietetics to be followed in these cases is to submit to the idiosyncrasies and inclinations of the patient.

---

* "That legumin constitutes not only a nutritious article of diet, but also suffices for all the demands of nutrition as respects the nitrogenous metamorphosis, is evinced by the experiments of Rubner on an adult in whom, by the administration of 520 grams of peas, all the demands necessary to preserve the equilibrium of the nitrogenous metamorphosis in the body were satisfied." Quoted from Munk, Uffelmann, Ernährung.

It remains for us to consider in how far we can utilize the scheme of diet laid down for chronic gastritis in cases of carcinoma ventriculi.

So long as the glandular apparatus exhibits a tolerably fair activity and the motor insufficiency is not so marked, we may with advantage employ a diet such as is indicated in advanced states of chronic gastritis. Milk, containing, as it does, a considerable percentage of albumin in a digestible form, will add much to support the nutrition of the patient.

As the diminution in the production of hydrochloric acid progresses, the farinaceous articles of food will be found to agree best with the patient. As the early supervention of motor insufficiency is one of the characteristic features of carcinoma, the most scrupulous care in the preparation of the food is necessary. Alcohol in the form of cognac or port-wine is of service in supporting the nutrition of the patient. Fat, in the form of good butter, is not contraindicated. Cocoa and chocolate because of their high nutritive value do good service.

When the ferments show a very slight or negative reaction we may render the food somewhat more digestible by the process of peptonization. Peptonized milk and gruel may in this way be administered to advantage.

With the Germans the preparations known as "Leguminosen" are held in high repute on account of their large nutritive value. I have myself, in my clinical experience abroad, seen very good results from the use of these preparations in diseases of the alimentary canal attended with impairment of nutrition.

When the motor power of the stomach exhibits a marked degree of impairment, the nutritive demands of the body must be satisfied by rectal alimentation. As the prognosis in carcinoma ventriculi leads to but one inevitable result, all that can be accomplished by alimentation is to support the nutrition, and in this way postpone the final catastrophe.—*Med. News.*

CLOTHES AND COLD-CATCHING.

DR. CLEVELAND, in a paper read at a recent meeting of the North London District of the Metropolitan Counties Branch, gave some interesting hints as to cold-catching and its avoidance. After referring to the damage which may be caused to internal organs—weak, perhaps, owing to previous disease or a delicate constitution by the congestion due to the action of cold on the surface—he went on to refer to the theory propounded many years ago by Sir Henry Holland in the following words: "It is . . . a question here whether variations of atmospheric temperature may not induce a state of body rendering it more liable to receive specific infections, however, generated by agents without." This view, as Sir William Priestley, who presided at the meeting, observed, has found support in the observations of Pasteur on the effect of lowering their temperature in rendering fowls liable to contract anthrax. The hypothesis, Dr. Cleveland went on to point out, suggests the desirability of specially protecting the body by warm clothing, exercise short of fatigue, and a diet perhaps more generous than usual during an epidemic of influenza such as that which appears now to be threatening London. He pointed to the great difference between the warmth of day and evening garments as worn, not only by women but by men, as a source of danger; and, in the case of the sterner sex, to the peculiar perversity of the tailor, who will make a waistcoat with a front of woollen stuff or even of fur, and a back of cotton material. Another piece of practical wisdom in the paper was a strong condemnation of the false pride which causes old and delicate people to go to bed with cold feet, and remain awake in consequence half the night, rather than confess to the comfort of a hot-water bottle.—*Brit. Med. Jour.*

Department of Hygiene.

WITH SPECIAL REFERENCE TO STATE AND PREVENTIVE MEDICINE.

Edited by E. O. SHAKESPEARE, M.D., PH.D.,

(PHILADELPHIA.)

ANIMAL EXISTENCE WITHOUT BACTERIA IN THE INTESTINAL CANAL.

THE problem as to whether the processes of alimentation and nutrition of animals were purely chemical and without any valuable or essential aid from bacteria, or were of a mixed character, one of the requisite factors being aid rendered by bacteria, now bids fair to be solved in some other way than by the dissatisfying methods of indirection.

Drs. George H. F. Nuttall and H. Thierfelder have recently published (*Hoppe-Seyler's Zeitschrift für Physiologische Chemie*, Bd. xxi., H. 2 and 3) a most important communication under the above title, relating experiments performed in the Hygienic Institute of the University of Berlin. On account of the general interest and very important bearings of the results of their investigations, we have made an abstract of the paper above-mentioned.

The work these authors have undertaken, and to some extent successfully, is quite unique, and the methods devised and followed by them are ingenious. Their work throws some primordial light upon a question concerning the solution of which there has been hitherto much groping around in the dark. The assumptions that the common bacteria always encountered in immense numbers in the intestinal canal during the ordinary post-natal existence of animals are or are not important factors in the preliminary processes of alimentation, has until now, we may say, rested upon argument by indirection.

The curious initial observations of our authors—the one an American, the other a German—seem to furnish the first positive proof we have that at least during the first eight days of extra-uterine existence of a mammalian animal living exclusively upon milk bacteria play no rôle in the intestinal canal essential to life, health, and development. The authors promise to continue their experiments far enough to demonstrate whether or not herbivorous animals can thrive on a vegetable diet without the aid of bacteria in the intestinal tract. They hope also to throw a side-light upon the mooted question of the intestinal origin of some of the aromatic substances excreted with the urine. For the most part the following abstract is in the words of the authors, as rendered by us into English:

In an annotation upon a work by E. Duclaux, "Sur la germination dans un sol riche en matières organiques, mais exempt de microbes," Pasteur, in 1885, in the *Comptes rendus*, vol. 100, p. 68, made the following communication:

"Often, in our conversations of the laboratory, for several years I have spoken to the young savants who surrounded me of the interest there would be in nourishing a young animal (rabbit, guinea-pig, dog, chicken) from its birth with steril nutriment. By this last expression I mean to designate aliment which one would artificially and completely free of the common microbes.

"Without wishing to affirm anything, I do not deny that I would undertake this study, if I had the time, with the preconceived idea that life, under those conditions, would become impossible. If this sort of investigation should be simplified in the course of its own development, one might be able to undertake the study of digestion by the systematic addition to the steril nutriment of which I speak of this or that species of microbe, or of divers well-determined combinations of species.

"The egg of the chicken would be adaptable without serious difficulty to experiments of this nature. Every living particle of dust banished at the moment when the little chick is born, and placed immediately thereafter into a compartment free of every kind of microbe—a compartment where a steril air would be renewed—steril food (water, milk, grain) could be easily supplied from the outside to the young chicken.

"Whether the result may be positive, and confirm the preconceived notion which I have advanced, or whether it may be negative and even inverse—that is to say that life may be more easy and more active—it would be very interesting to undertake the experiment."

These remarks by Pasteur had prompted us some years ago to undertake such investigations, although we were *à priori* convinced that we would obtain a result opposite to that expected by Pasteur. Through the ferments of the digestive tract the food becomes so quickly converted into substances readily absorbed, that the assistance of the bacteria is not at all required. The changes which especially the albuminous substances undergo through the micro-organisms are indeed at first the same as those wrought by the ferments, but they go very much further.

As final products of bacterial decomposition we are acquainted with aromatic acids, volatile fatty acids, phenol, cresol, indol, skatol, carbonic acid, hydrogen, methan, sulphuretted hydrogen, etc. — substances which no longer possess any nutrient value, which are not only useless, but are at least in part injurious to the body. Nencki gave expression to these reflections very soon after the appearance of Pasteur's remarks, and issued a very energetic contradiction of Pasteur's conception of the rôle of the bacteria in the intestinal canal.

However, the question once suggested must be answered; a categorical answer can be given only by experiment.

We have concluded to undertake the experiment and to discover if young animals born through a cæsarean section can be raised upon steril food within a box supplied with steril air. The idea of employing chicken eggs, which for many reasons have been suggested as advantageous for such experiments, was at once abandoned, since from common experience a large per cent. of these is infected *ab initio.*

We chose guinea-pigs as the animals for experiment after it had turned out that it is possible, at a considerable expenditure of trouble and care, but without any special difficulty, to raise these animals from birth on with undiluted cow's milk, which is given them from a sucking-bottle.

Young guinea-pigs appeared to be especially suitable for our purposes on account of their great independence. We believe we are now warranted in saying that at least among all the mammalian animals likely to be used these alone are adaptable.

[For a full comprehension of the ingenious and complicated apparatus used by our authors and their method of procedure, the reader is relegated to their original communication. We omit entirely that portion of their paper, and take it up again at the point where, after the apparatus has been prepared and the cæsarean operation performed, the little young guinea-pig finds himself in his new home in the box with completely steril surroundings.]

At first the animal lay upon the side, but soon got up and began to clean himself, becoming the more active the dryer he was. After twelve hours he drank for the first time, and was fed thereafter every two hours day and night (to the end of the experiment). There was some difficulty with the first feeding; each succeeding time, however, it was simpler until all trouble disappeared. The excrement had a normal consistence, a brownish or dark greenish color, diarrhœa occurring at no time. The other animals of this litter were brought up in quite the same way, as control animals, only with the difference that they breathed the ordinary air and drank unsterilized milk.

Eight days after birth, after the guinea-pig had drunk something over 330 cubic centimetres of milk, and had been pronounced by several competent gentlemen to be apparently quiet normal, healthy, and active, we interrupted the experiment. The milk-supply might, perhaps, have lasted for one or two days more, but the uninterrupted attention day and night had so reduced us physically that we had to end the matter.

The animal was withdrawn from the apparatus, killed, and opened under antiseptic precautions. *An examination of the intestinal contents in stained and unstained preparations revealed the complete absence of bacteria.* Although this discovery was decisive, we attempted ærobic and anærobic cultures—gelatine and agar roll cultures, as well as stab cultures in sugar-agar, etc.—from the contents of the small and large intestine from the milk and from the excrement which had collected under the oil stratum (of the apparatus). *All the culture tubes remained perfectly steril; not a single colony could be observed.*

It is to be regretted that it was not possible to establish by actual figures an increase of weight of the animal, for weighing at the beginning of the experiment was from the nature of the case excluded. But that an increase had taken place is, with a probability bordering upon certainty, deduced from the circumstances of the weights of the control animals. One of the latter—the second, small and weakly from the beginning, died during the experiment—was at birth apparently of the same size as the experiment animal; at 24 hours' old it weighed 73 grm., a week old 82.5 grm., whilst the experiment animal at the latter moment weighed 83.0 grammes.

The question on account of which the experiment was undertaken is therefore decided in the manner we expected: *the presence of bacteria in the intestinal canal is for the life of the guinea-pig, therefore for other animals and for man also, not essential, at least not so long as the food is of an animal nature.* How it may be for vegetable or mixed diet, further experiment may teach.

. . . .

Only through investigating the urine of animals free of bacteria can the problem be finally solved as to the locus of formation of the aromatic acids.

We are busy now with the arrangements for the researches. Our next task shall be to learn if the herbivora can live without the aid of the bacteria in the intestine.

A SOCIAL OUTRAGE.

The above words came with burning indignation to our mind as we read some weeks ago a newspaper paragraph chronicling under a sensational heading the formal solemnization of marriage between an incarcerated criminal and a silly but pretty young woman who had become enamoured of him through sympathy excited during his trial and imprisonment. The account stated that the ceremony was performed in the warden's office, and that this officer and other jail officials were formal witnesses. The criminal's name indicated foreign birth or parentage. What the crime was for which the man was still undergoing incarceration we do not now remember, but it was of a high grade.

The heedless, mawkish sentimentality which permitted this preliminary step to be taken for a new progeny of criminal propensities to be begotten and ultimately launched against society, with the aid, encouragement, and connivance of the warders—probably, also, even of the governors of the penal establishment—is far too often displayed to be passed without attention or reprimand.

That there is an hereditary propensity to crime transmitted to offspring from criminal parents seems to be gaining very wide acceptance. The evidence is becoming so strong that we should act, at least in the administration of our prison establishments as if it were unshakable.

Unfortunately a dangerous percentage of the immigrants who come to us annually is of the criminal class, and there seems to be as yet no indication that adequate national legislation may soon be enacted which will materially lessen the evil. Statisticians tell us that most of the pauperism, crime, and insanity in this country is traceable to the immigrant and to his children.

We should at least do what is possible to prevent the propagation of criminals whilst they are deprived of their liberty on account of crime they have committed. Let us frown down upon the perpetration of such outrages against the future moral tone of our race as that mentioned above. And when such an outrageous act is permitted by some more tender-hearted than wise official, the wench, who is usually made the heroine of the story solely through the medium of the press, if at all, should be dropped into oblivion by being nameless. It were well also that the officers of the law found aiding and abetting such an offence against the moral tone of our future race should not go scot free.

THE PRESENT STATUS OF SEROTHERAPY.

At the Sixth Congress of the Italian Society of Internal Medicine held at Rome, October 22 to 25, the present status of serotherapy was discussed by Pio-Foà, of Turin; Maragliano, of Genoa; Petrone and Fazzo, of Naples; Campana, of Rome, and other eminent bacteriologists and clinicians.

Maragliano claims to have experimentally obtained an antitoxic serum which possesses curative efficacy in tuberculosis, and which is giving good results in his own practice and in that of several of his *confrères;* the mode of preparation of this serum will eventually be published, though he is unwilling to make it known at present, though derived, as he says, "from animals vaccinated with all of the toxins contained in the virulent cultures, both those that resist and those that do not resist heat." Campana, of Rome, affirms his belief that Maragliano's serum is nothing but Koch's tuberculin, improved. As a dermatologist, he declares that this lymph in tuberculous affections of the skin favors the resorption of morbid infiltrations, but does not cure the tuberculous processes, and the same affirmation applies to tuberculosis of internal organs.

Fasano, of Naples, reported a case of pulmonary phthisis which seemed to have markedly improved under the use of this serum. Marrani, of Rome, has treated with benefit twelve cases of tuberculous broncho-pneumonia with Maragliano's serum. The results were: disappearance of the fever, of the râles, of the cough, of the dulness, a gain in spirits and in appetite, and increase of weight. Ascenzi, of Rome, and Argento, of Palermo, communicated—the first three, the second five—cases of tuberculosis treated with success by Maragliano's serum.

With regard to the serum treatment of diphtheria, Mya, of Florence, stated that he had treated 112 cases of diphtheria at the clinic of children's diseases with Behring's antitoxin; the results were 22 deaths and 90 recoveries. In a first series of 51 cases, he had to do with diphtheria of the pharynx and larynx; there were 15 deaths, giving a proportion of 29.4 per cent. (under the old treatment he used to have in these cases a mortality of 50 per cent.). A second series of cases comprehends 43 cases of simple diphtheria of the pharynx, with 7 deaths and 36 recoveries. In a third and last series, there were 18 cases of pharyngeal diphtheria with beginning of extension to the larynx; all these recovered rapidly. In all these cases the diagnosis was controlled by the bacteriological examination.

Mya is in the habit of injecting daily during the first three days of the sickness ten cubic centimetres of serum. In fatal cases he has often observed want of success to coincide with a notable degree of hypertrophy of the glands; the autopsy has disclosed, along with grave alterations of the lymphatic system, fatty degeneration of the viscera. He is persuaded that if one would have recourse with success to serotherapy in diphtheritic cases, there must be relative integrity of the lymphatic system. Another group of cases in which serotherapy proves inefficacious includes those forms of diphtheria in which the exudate invades very rapidly the whole respiratory tract—that is, not only the larynx and trachea, but also the bronchial tubes. It is principally in the coldest months of the year that he has observed cases of this kind.

Maragliano, in summing up the diseases in which serotherapy has been employed with more or less of success, remarks that in streptococcus infection (notably in erysipelas and puerperal septicæmia) the serum treatment has already produced sufficiently encouraging results to warrant further trials.*

No success has followed attempts to similarly treat typhoid fever and cholera, that is, by the usage of a serum obtained from patients recovered from the disease, or from immunized animals.

In tetanus, the results obtained with serums obtained from animals immunized by attenuated toxins have not been remarkable. In 30 cases so treated there have been 13 recoveries.†

Maragliano sums up the statistics of serotherapy in diphtheria by citing Heubner's figures: In 3036 cases there was a mortality of 20.6 per cent.; this is contrasted with a mortality of 38.8 per cent. before the usage of antitoxin. He thinks that "the enthusiasm aroused by the discovery of Behring has been justified by the splendid results obtained in practice."

With regard to the serum treatment of pneumonia, there is little to add to the results obtained some time ago by the two Klemperers, and by Fowlisky and Emmerich; the Klemperers, in particular, claiming remarkable clinical success in several cases with their "antipneumotoxic serum." Pio-Foà, who was referee at the meeting of the Congress aforesaid, has been making numerous experiments on animals with a serum of his own preparation, which he calls an "antipneumococcic vaccine." He first tried glycerine extracts of infected blood, the glycerized extracts of the bodies of bacteria remaining on the filter, the precipitates obtained with sulphate of ammonia, etc. After having found out the complete inefficaciousness of the chemical vaccinations, with the exception of the filtrate of the *meningococcus*, he tried to obtain a vaccine prepared according to Pasteur's methods (attenuated by heat, by oxygen, by light, etc.). He finally obtained the desired attenuation by means of Lugol's solution, and by employing the method of intravenous injection he now succeeds in vaccinating hares against the different varieties of diplococcus lanceolatus, so as to cause them to support with impunity 160 cubic centimetres of a culture sufficiently virulent to kill the test animals in a few hours; the duration of the immunity seems to be quite long—that is, three months at least.

The experiments which Pio-Foà related, where hares, dogs, sheep, and goats are rendered refractory to the pneumococcus infection, were of great interest, and warrant hope that the serum treatment may yet be found to be of unequivocal benefit in the pneumococcus diseases of man. Foà found that when both the diplococcus and the serum were injected at the same time, the animal survived, and when the serum was injected five hours after the infection, the symptoms were light and the animal soon recovered; which indicates that the serum also exercises a curative action.—*Bost. Med. and Surg. Jour.*

THE TREATMENT OF SYPHILIS BY INJECTIONS OF SYPHILITIC ANTITOXINE.

THE November number of the *British Journal of Dermatology* contains an abstract of a paper read at the Section in Dermatology at the recent meeting of the British Medical Association by Dr. Edward Cotterell, who remarked that syphilis had been and was now being treated by some surgeons with injections of animal serum, the *rationale* of this treatment being that, as no one had yet succeeded in producing any of the manifestations of syphilis by inoculation or otherwise in the lower animals, there must be some property in their tissues which rendered them proof against syphilis.

---

* See this *Journal*, vol. cxxxii., p. 444.

† See also this *Journal*, vol. cxxxii., p. 287.

Dr. Frederick Mott, said the author, had suggested that possibly the injection of serum obtained from a person who had gone through an attack of syphilis, and so had been rendered safe from subsequent attacks, might be more efficacious in the treatment of a recent attack of this disease than the serum obtained from animals, and the speaker had determined to put this method of treatment into practice.

The following arguments, he said, had led him to try the experiment:

1. One attack of syphilis confers immunity from subsequent infection upon the individual affected, the exceptions to this rule being so rare that they may be entirely disregarded. Therefore an individual who has, or who has had syphilis, possesses some property within himself which renders him immune from any fresh infection from this disease.

2. Although at the present time it has not been definitely proved, still it is highly probable that syphilis is due to some specific micro-organism, and that the symptoms of so-called secondary syphilis are due to the production of a toxine by this specific bacillus. So, again, it is probable that the immunity observed from second attacks of syphilis is due to the presence of some material in the blood which for want of a better name we may term "syphilitic antitoxine."

This, said the author, was consonant with Dr. Klein's statement that when an animal had passed through one attack of a given infectious disease—that is, when an animal had served as a host for the growth and multiplication of a particular pathogenic bacterium—it was found that its blood had acquired a peculiar faculty. The blood had become capable not only of inhibiting the further growth of the bacterium but also of neutralizing the toxines produced by the bacterium.

Animals, therefore, which had acquired immunity possessed in their blood a something that they had not had before, and this substance belonged to a group of substances called antitoxines.

3. It is a matter of common observation that a child, the subject of hereditary syphilis, may be born of a woman who has never exhibited—as far as can be made out—a single sign or symptom either of the primary or of the secondary manifestations of syphilis, and in addition she shows herself immune to the poison of that disease, for she cannot be inoculated with it either by her own syphilitic offspring or by the poison from any other source.

Without going too deeply into the nature of this strange immunity, said Dr. Cotterell, it might perhaps be explained by presuming that by some means, possibly due to some peculiar property of the placenta and its circulation, only the syphilitic antitoxines from the fœtus reached the tissues of the mother, and in this way she was rendered immune to the disease which the father had transmitted to his offspring.

Passing on to the practical application of these theories, he briefly related the following results so far obtained in eighteen cases where this method had been the only one employed in treating the disease:

1. In the early stages of syphilis—*i.e.*, when there was only a sore and glandular enlargement—injections of this serum caused the sore to heal rapidly. The adenitis in the groin generally became intensely marked, the skin and throat symptoms were absent, or only slightly marked. 2. Where the case was not seen until the rash and throat symptoms developed, the skin eruption faded rapidly, much more rapidly, as a rule, than under mercurial treatment, but the throat symptoms disappeared rather slowly. 3. The general health improved. 4. The serum from an individual with well-marked secondary syphilis appeared to be more active than that obtained from a patient with tertiary symptoms. 5. The amount to be injected had not been accurately determined, but he had used the serum in doses of from half to five cubic centimetres.

These conclusions, said Dr. Cotterell, had been arrived at after over six months' experience with the method of treatment. The number of cases had been too small and the length of time too short to make more definite statements upon the method, but he would be glad if other members of the profession would give the method a trial and report upon it. He especially recommended its trial by army surgeons, as they had the best opportunities of observing the results of treatment of syphilis, from the fact that they could keep their patients under observation for a prolonged period, a thing which was next to impossible with hospital patients.—*N. Y. Med. Jour.*

DEGENERATIVE HEREDITY; OR, SOME DEGENERATIVE INFLUENCE OF MODERN CIVILIZATION ON HEALTH.

By Dr. Charles Denison,

OF DENVER.

The discussion of this question was divided into five propositions.

First, the advance in the healing art, in so far as the saving and prolongation of life is concerned, suspends the law of natural selection, and permits the weak to propagate their kind.

The tendency to or aptitude for tuberculosis in the offspring was the main point dwelt upon. The doubling of diseased tendencies in the progeny of those consumptively inclined was emphasized as a result of the intermarriage of certain classes. Analogies were noted in the high-breeding and inbreeding of cattle, and the results were given which explain the remarkable [prevalence of tuberculosis in all the highest-bred herds. The conclusions were given, going to show that high-breeding is synonymous with inbreeding, and this surely leads to scrofula, which in turn is a sign of or surely leads to tuberculosis. Illustrations of similar effects were given in the human family, and the resulting decadence or degeneration in the highest grades of aristocracy and plutocracy were explained.

As to the disease consumption, "with all our splendid climatic and other advantages arrest is not the eradication of the disease; on the contrary, the total of hereditary influence is necessarily increased because more affected persons survive. . . . The vicious seed is not destroyed, but preserved to be again mixed with the good, . . . and it becomes a serious problem how a community like that in Colorado, largely made up of recovered invalids, will be governed in future, that a normal state of health may be assured to her inhabitants."

Second proposition. The present civilization stimulates the intellectual and nervous system to such an extreme as to injure the physical (reproductive) powers and favor sterility.

The results of the strivings to excel both in the social and intellectual world are given in the working out of a law of decadence of the race, a failure at the top which has to be made good from the lower orders, or there would be an extinction of the race. This all serves to confirm the statement of Royce in "A Study of Genius" that "mental exertion actually restricts the reproductive energy."

"This tendency to degeneration and to consequent race extinction among those classes devoted to advanced intellectual pursuits is by no means a peculiarity of sex. That women are not exceptions to the rule is shown by the remarkable paucity of healthy living children born of members of high-class women's debating clubs, as well as of authoresses, lecturers, and female physicians."

Third proposition. The social, commercial, and manufacturing phases of our civilization favor indoor and effeminate modes of life, which are detrimental to successful development, and inheritance propagates the depreciated life force.

Statistics were appealed to in support of this proposition. The large proportion of our people devoted to what may be classed as indoor occupations is shown by the census report of 1890, where what may be called the outdoor occupations—*i.e.*, agriculture, fisheries, and mining—are represented by about 9,000,000 souls, and "professional service, domestic and personal service, trade and transportation, manufacturing and mechanical industries all together by about 13,700,000."

Fourth proposition. The independence and self-supporting of women in clerical positions removes from the probability if not the possibility of successful motherhood a considerable portion of the so-called gentler sex, through the resulting great decrease in matrimony and the exhaustion of the vital powers of women in nerve-taxing occupations. Among other facts presented in support of this proposition was the increase in the females represented in various occupations, as shown by a comparison of the census of 1890 with that of 1880. One item of which comparison—that of "Trade and Transportation"—showed an increase of males so employed of 71 per cent., and of females 263 per cent.

Fifth proposition. The present unaided efforts of natural selection should be supplemented by warning the young before matrimony; the masses ought to be educated physiologically, that the laws of heredity may be understood, that physical development and mental strength may be appreciated, and the responsibilities of parentage recognized. The State and the nation have a duty to perform. The literature extant, and that needed to instruct young people in the choice of their mates in life, was here discussed, and a rule for choice of partners to avoid consumptive offspring, original with the author, was presented, based upon a combination of main factors: 1. The percentage of a party's parents, uncles, and aunt's children who had survived the age of five years; 2. The inheritance of the party to consumption, cancer, or scrofula; 3. The party's own health; and 4. The doubling of bad strains by the intermarriage of those with like defects.

"Considering that the object of matrimony is the begetting of children, it would be a good thing for the State to legally recognize that it is as much a sin for an invalid in advanced consumption to marry as it is for a leper or an insane person. As for two tubercular or scrofulous persons marrying each other. it ought to be prevented by law if possible; otherwise it ought to be understood that such tainted unions are not for the purpose of progeny. Since the law is not allowed to interfere and help solve this problem, the only recourse is *education*. With us Americans this is the saving grace from the universal law of degeneracy. The lower strata are constantly made capable and worthy to take the places made vacant by degeneracy in the upper. To give character, mental force, and healthy bodies, fit for the propagation of a truly noble race, a change in our system of education is needed." The introduction of physical training is needed, and the regular superintendence of the physical condition and habits of scholars, also the introduction of science teaching, the teaching of physiology and anatomy, and finally, in seminaries and colleges, direction should be given to all this previous acquirement by books purposely written for both young men and women, to enable them to understand the whys and wherefores of the correct mating of the sexes.—*Sanitarian.*

A PHILOSOPHICAL EXPLANATION OF A NOTED MIRACLE.

A SPECIOUS *simulacriste* has lately come to grief and punishment after worrying the great Parisian neurologists and after having been the subject of the most remarkable curative miracle ever performed at the grotto of Lourdes. It appears that this expert malingerer—a hatchet-faced and hypocritical individual named Delanoy—first appeared at the Salpêtrière in 1883, during the services of M. Charcot; from this hospital he went to the Hôtel Dieu, where Dr. Gallard treated him for three months. Two years later he turned up at the Necker Hospital—always with locomotor ataxia—where Rigal subjected him to the most rigorous anti-ataxia treatment—the liberal application of the actual cautery on both sides of the spine, which our impostor suffered with a heroic fortitude for four months, rather than go out and work. From the Necker and baffled Dr. Rigal, he was next found at the Laënnee Hospice, where the great Dr. Ball industriously filled him with nitrate of silver, belladonna, and morphia, to no purpose. The Charité was his next abiding-place, but Ferrecol decided the man was an incurable and had him transferred as such to Bicétre, from whence he managed to escape. The next year he appeared at the Cochin Hospital, during the service of the late Dujardin-Beaumetz, who in the course of two months suspended the martyr-hero by a French modification of Sayers's suspension apparatus, some 52 times without any seeming benefit. Having exhausted the Paris hospitals, as well as the patience and ingenuity of their great masters, Delanoy concluded that it was about time to recover, and to that end he had himself transferred to Lourdes, where he arrived in August of 1889. As he dragged himself to the grotto, the seeming torments which he endured wrung yells of agony from the sufferer, to that degree that they called the attention of all the assembled pilgrims. At the grotto he received the sacrament, and with a cry of joy suddenly regained his normal health and strength.

The clergy of Lourdes made great capital out of this miracle, and it goes without saying that Charcot, Ball, Rigal, and all the great neurologists were sorely puzzled. The man was evidently so much under the protection of the saint that soon after his recovery he received letters with cheques and postal orders asking for his prayers and intercession for the writers, who were either sick or crippled, the latter judging that one who had been so highly favored and miraculously treated could not be without influence with the saints. In time, however, he was forgotten, and to live without work induced him to retake his old vocation of hospital tramp, and as such we next hear of him on the service of Dr. Dubuisson, at the *Asile Sainte Anne*, with his old locomotor ataxia in prime working order, where, while being closely watched—he having been recognized as a skilful malingerer—he stole a large sum of money from the pharmacist of the institution and was arrested, and all his deceptions unveiled. The clergy of Lourdes had looked upon his cure as a most conclusive evidence of the superior power of theoretic medicine and of miracles over purely philosophical medical science, but the exposure of the deception has cast a damper over the zealous and pious believers in miracles, as well as an inescapable gloom and discontent over the fathers at Lourdes. After his arrest it was learned that as an evidence of his great gratitude while at Lourdes and while being entertained by the admiring clergy, he had relieved a couple of them of all their surplus wealth.—*Pac. Med. Jour.*

LEGISLATION FOR HABITUAL DRUNKARDS.

DEPUTATION TO THE HOME SECRETARY.

Dr. Norman Kerr said that habitual drunkards, with the increasing proportion of diseased inebriates, especially females, constituted a menace to public order. Regarding police-court inebriate offenders, it was now generally agreed that the existing procedure was a miserable failure, and neither deterred nor reformed. There was a physical as well as a moral aspect of inebriety, and curative treatment had been recommended by six State reports. As to non-criminal habitual drunkards, the existing acts of Parliament required amendment in the direction of facilitating the entrance of patients into homes for inebriates by rendering a declaration before one justice or a statutory commission sufficient instead of the declaration having to be made before two justices. Persons addicted to any narcotic, such as opium, morphine, chloral, or cocaine, should be included in the definition of habitual drunkard. There were few homes for poor inebriate women, and none at all for poor inebriate men. Provision ought to be made for habitual inebriates who could not afford to pay. It would not be a new departure in English jurisprudence to subject to compulsory seclusion inebriates who had not broken the law, as the existing system provided for the compulsory treatment of insanity, of which disease inebriety was practically a form. An effective measure would be incomplete unless it gave power for the curative detention of non-criminal habitual drunkards in retreats, and provision could be made guarding against any possible abuse of such power by the interposition of a judicial authority.

Cardinal Vaughan agreed that further power was required to commit habitual drunkards to homes, treatment in which had effected some 8 or 9 per cent. of cures.

The Rev. Canon Duckworth remarked that the legislation proposed by Dr. Kerr would not be in advance of public opinion, and that those for whom he spoke were as zealous as any one for the liberty of the subject, but failed to see why the liberty of the inveterate sot should be more respected than the welfare of his family and himself.

Sir W. Charley, Q.C., suggested the restoration of the compulsory clauses of the Bill of 1877. The percentage of cures effected in homes was more like 30 than the 8 or 9 that had been mentioned. Where was the "liberty of the subject" in such a case as that of Jane Cakebread, who had been committed nearly 300 times? Magistrates ought to have the option of sending such cases to homes instead of the prisons.

Dr. Danford Thomas said he was there to plead on behalf of the poor for the suggested amendments. During his twenty years' experience as coroner, he had daily held an inquiry into death due directly or indirectly to drunkenness. It was no more interference with liberty to send inebriates to be treated in homes than to send cases of infectious disease to hospitals, and the money that the public now had to pay for drunkards in prisons, work-houses, etc., would meet the expense of their curative treatment.

Mr. C. J. Maddeson concurred, remarking that when industrial schools were proposed objection had been raised on the ground of expense, but experience had proved that what they cost the country in one way was saved in another, and that would also be the result of providing the proposed homes for inebriates.

The Home Secretary replied that it did not require such an influential deputation to convince him of the importance of the question. The difficulty of dealing with the non-criminal habitual drunkard was very great, but he could not ignore the reports of the committees to which reference had been made, and it would be of the greatest importance if he could strengthen the homes while at the same time guarding the liberty of the subject. To cure the criminal inebriates (some 6000 females of that class were at present imprisoned) would be a saving to the country. Something ought to be done, and parts of the bill of his predecessor in office might serve as a basis for tentative legislation.

Dr. Norman Kerr, having expressed the thanks of the deputation, the proceedings terminated.—*Brit. Med. Jour.*

SANITARY HINTS FOR TRAVELLERS TO VENICE AND THE ADRIATIC.

A MEDICAL contributor to the European edition of the New York *Herald* writes upon the above subject from a personal and repeated experience as a sojourner in Venice. He points out, in the first place, that the rate of mortality in that city in 1894 was 22.3 per 1000, making about the twentieth in the list of healthful great cities. He also gives the following sanitary data for the use of visitors:

"The stranger on arriving in Venice must take certain precautions. In winter one must protect oneself from dampness, go out little in the evening, wear flannel, take long walks, and beware of the poetical gondola. In summer care must be taken not to catch cold while listening to the music on the Plazza San Marco; an overcoat should always be carried on the arm. In the restaurants travellers should not allow themselves to be tempted by oysters or shellfish, which so often occasion very disagreeable cases of enteritis; under no pretext should any ice be used in the drinking-water, which should only be cooled exteriorly. These last two pieces of advice are absolutely essential; their non-observance is one of the chief causes of the gastro-intestinal disorders that occur in Venice during the hot weather.

This year, during the intense heat of September, the number of such cases was very high, whereas it would have been very easy to avoid them by regulating the diet more sensibly.

"The city, so wonderful in light, art, and history, which still carries proudly its ancient title of Queen of the Adriatic, has a strange attraction for every one who has once put foot in her streets. When one has once been to Venice one goes again, and each time one returns something new, something not yet seen, seizes your attention and fascinates you like a dream that one suspects of being reality.

"The absence of dust in the atmosphere of Venice, its pavements in large flag-stones, the saline dampness of the air, and the high atmospheric pressure form an excellent group of conditions for lessening the spread of consumption; and in the statistical tables that were furnished to me I remarked that the death-rate from pulmonary phthisis was relatively very low. Thus on an average there is in Venice only one death from consumption per ten, whereas in Paris the proportion is double—two in ten. This is a very interesting fact, which may lead us to send to Venice, possibly not chronic cases of phthisis, but persons with a predisposition for the disease and in danger of picking up contagion. It is evident that in sending a consumptive to Venice it would not do to choose a torpid case, but patients that are nervous, anæmic, and excitable.

"A splendid aqueduct, built about ten years ago, brings to the city a supply of spring-water from the mountain. Since that date the sick-rate from typhoid fever has considerably diminished, and gastric fever, formerly so common, is now much rarer, and since it also now assumes a far less serious character it is much easier to cure. Great care must be taken not to drink well-water, which is always more or less contaminated by infiltration, and which must contain microbes or impure elements which were probably not without their influence on the bad reputation the city used to have from a sanitary standpoint.

"In Venice apartments on the upper stories of the houses are certainly healthier than those on the lower, which, strange to say, are always more eagerly sought after. It is, perhaps, better form to live on the first floor, but it is healthier on the second or even on the third. The Venetians themselves are quite alive to this fact, as in the old palaces the finest apartments are on the first floor, which is raised as high as possible by an entresol."—*The Journal.*

THE CONTROL OF TUBERCULOSIS IN MASSACHUSETTS.

Prof. F. H. Osgood, of Harvard University: In 1892 tuberculosis was first put on the list of contagious diseases in cattle in Massachusetts, and animals were ordered killed, and their carcasses disposed of otherwise than as food, but no compensation was to be received by the owner. At that time they relied on physical examination. The first year there was not much opposition, but after that the inspection service was so much changed and improved that considerable opposition was excited, for a large number of emaciated animals, detected on physical examination to have tuberculosis, were destroyed. Infected carcasses had to be disposed of by burying. At the end of 1893 the Commission met with considerable opposition from farmers and butchers, who went to the Legislature in 1894 with a demand for compensation. The Legislature that year allowed one-half value to the owner. It then became necessary for the Commission to provide against importation of infected cattle and meat from without the State. On imported cattle the use of tuberculin was allowed as a test, and the next year its use was allowed in the case of cattle within the State, and full compensation was given the owners. As a result, a much larger number of owners requested inspection of their herds, and a larger number of cattle were destroyed. In all instances in which the cattle had been condemned under the present law—that is, since June 5, 1895—the carcasses showed tuberculosis, with but a few exceptions, the errors amounting only to 0.1 per cent. in the present year. Over one-fourth of the cattle of the selected herds of the State, examined by request, showed tuberculosis; but the percentage of those infected varied in different parts of the State from 0.9 to 95 per cent. The experience of the Commission has demonstrated to its satisfaction that where all diseased animals are removed at the first examination made with tuberculin, and the premises thoroughly disinfected, the herd has remained healthy, as indicated by subsequent tuberculin tests made at periods varying from six to nine months The provision is made by the Commission, and strictly insisted on, that after a herd has been tested and all diseased animals removed, the premises shall be thoroughly disinfected, and such sanitary regulations carried out as are directed by the Commission, and that no animal shall be introduced into the herd until it has been subjected to the tuberculin test and proved free from disease. The Commission has received a number of drugs intended for the cure of consumption, but on use they have been found without value or to consist of remedies whose action is well known. Now that we have an agent that will reveal tuberculosis in its earliest form, are we justified in advocating measures which leave the eradication of the disease to the option of interested persons? Are we justified in continuing to allow the milk-product from animals to be placed on the market without a certificate as to the health of these animals, based on the tuberculin test?—*Am. M.-S. Bul.*

EARLY MARRIAGES.

THE recent marriage of a young woman of wealth, aged eighteen, to a young man of title, has given rise to infinite discussion on matrimonial alliances and matrimony in general. So far as we have noticed, however, none of the commentators upon the great current hymeneal events have brought up the question of early marriage in its relation to health. Yet this is perhaps one of the most important of the subjects which could possibly concern those proposing to enter the new estate. It seems almost pathetic that not one of the reporters on the daily press came across the striking remark of Dr. Clouston to the effect that "the young man who marries before his beard is fairly grown breaks a law of nature, and sins against posterity." The subject of early marriage, and the proper time, so far as age is concerned, for marriage, has often been discussed, and medical opinions upon the matter are numerous enough. Very few physicians, however, have really investigated the matter in the careful method which physiological science demands. Dr. Mathews Duncan is one of these few. A short time before he died he wrote some elaborate article bearing upon this subject, and from his studies and his experience he drew the conclusion that below twenty years of age woman is immature. If she marries before that time, she runs considerable risk of proving sterile. If she bears a child, she runs a comparatively high risk of dying in childbirth. In addition to this, he found that an early marriage had other disadvantages associated with a more frequent tendency to have uterine disorders.

The most elaborate statistical investigation of the subject, however, has been made by Josef Carosi, of Buda-Pesth. His investigation was a purely statistical one, based upon the percentages of deaths, diseases, the births, and so on, in connection with age and marriage. He concluded that immature persons have a tendency to bring forth a degenerate stock; in other words, that persons who marry before they are mature have a larger percentage of cripples, consumptives, idiots, and criminals. The age of maturity is placed at twenty for the woman, and for the man at twenty-five.

Dr. Farr states, in his "Vital Statistics," that the mortality among wives under twenty years is much higher than that among wives in the period between twenty and thirty, and this same author found that the mortality-rate from accouchements between the ages of fifteen and twenty-five was 1 in 149, while between the ages of thirty and thirty-five it was one in 235. Such statistics were collected, however, before the day of antiseptics, and it is possible that they might tell a different story now.

According to a writer in *The Hospital*, the experience of breeders of all kinds bears out the view that the progeny of immature animals has a tendency to be weaker than those of mature. Against all this may be offset the fact that a great many people who marry young have healthy children and live happy lives, and the further fact that if marriage is prolonged too late, perhaps even more disastrous results might occur, to the woman at least.

The facts regarding early marriages in India might also be cited, as showing that they do not, at least particularly, change the character of the race.—*N. Y. Med. Rec.*

INFECTED CABS.

A RATHER curious case, illustrating the divided responsibility which exists as to the measures necessary for the prevention of the spread of infection, came before Mr. Sheil at the Westminster Police Court on November 18. It appears that on November 9 Dr. J. J. Marsh, Honorary Physician to the Chelsea, Brompton, and Belgrave Dispensary, saw a case of diphtheria in a child at the dispensary house in Sloane Square. He told the mother to take the child home, and, on her way, to leave the notification certificate at the Chelsea Town Hall. At her request he allowed the dispensary porter to call her a cab. At the town hall the sanitary inspector took the number of the cab, and told the cabman to drive the patient and mother home, and return. On doing so the cabman was told that the child was suffering from diphtheria and that his cab must be disinfected. Owing to the time this process took he incurred a loss which he estimated at £1. The sanitary authority refused to compensate him, and he sued Dr. Marsh. The magistrate said that he was satisfied that Dr. Marsh was not liable. Having obtained a decision on that question of principle, Dr. Marsh offered to compensate the cabman, but Mr. Sheil intervened, and said that he would cause inquiries to be made, as the case might be one for the Court to relieve. Every one will feel that it is a hard case for the cabman, and will not withhold from Mr. Marsh his meed of sympathy. At the same time it seems hardly right that the cabman should be compensated out of funds subscribed for charitable purposes. In equity, if not in law, the charge ought to fall upon the sanitary rate. Similar difficulties, which used to be of somewhat common occurrence, have been met to a large extent by an arrangement between the Metropolitan Asylums Board and most of the institutions which treat out-patients in London. Under this the Board undertakes, on receipt of a message by telegraph or telephone, to send an ambulance to remove a patient suffering from any of the infectious diseases treated in its hospitals. By this shortening of procedure not only is a great deal of time saved, but all these troublesome questions which must arise when the infected person is taken home by friends are avoided. The advantage to the patient, also, is obvious, and the general extension of this plan to all the public medical institutions treating out-patients is much to be desired.—*Brit. Med. Jour.*

BACTERIA IN ICE.

THE dangers incident to the consumption of ice obtained from polluted sources, as lakes or ponds receiving sewage, have been much insisted on; and not only have actual instances of the communication of enteric fever in this manner been quoted, but the bacteriologic examination of different samples of melted ice have been adduced to show that the process of freezing has no influence on the number or vitality of the microbes. Ice-water, for example, from the Spree, has been found to contain 1700 to the c.cm., and from the Lake of Geneva 210, while melted hailstones yielded 72. But the recent experiments of Professor Christomanor, of Athens, go some way toward justifying the old and popular belief in the purifying action of congelation, which, as he shows, effects a partial separation of all impurities, concentrating them in the inner portion of the mass. Examining blocks of artificial ice from a factory supplied by a well, and others of water from the aqueduct of Hadrian, he observed in all a central core, forming about a fourth part of the entire volume, and in its whitish, dull, somewhat granular appearance contrasting strongly with the perfect and colorless transparency of the surrounding ice. While the original water from the aqueduct contained 30 milligrams of "organic matter" (solids lost in ignition?) in the litre, that from the clear ice showed only 2.8, while the turbid central portion gave 105.5. So with the water from the well, the 64 milligrams in which were divided in the ice into 5.5 and 202 milligrams per litre, respectively. It is remarkable that, though the one water was charged with organic, or presumably organic impurities, to the extent of more than twice as much as the other, the relative proportions in which these were distributed in the ice were practically identical, being respectively as 9.3 and 351.6, and 8.6 and 311.3 to 100 parts, or roughly, 1–11 of, and 3 to 3½ times the impurity of the water.—*Brit. Med. Jour.*

VARIOLA AND VACCINIA, THEIR MANIFESTATIONS AND INTER-RELATIONS IN THE LOWER ANIMALS.

COPEMAN (*Journal of Pathology and Bacteriology*, Vol. II., No. 2) concludes his researches concerning the above subject in the following propositions :

1. The organisms to which the specific action of variolous and vaccine lymph is due are, as yet, undiscovered.

2. Although this is the case, all the most reliable evidence, experimental and otherwise, is in favor of the organisms of these two diseases being identical in nature ; the phenomena of vaccination being most probably due to an attenuation of the virus, caused in a similar manner to that witnessed in chicken cholera and other diseases by sojourn in the tissues of an animal which is more or less refractory.

3. Monkeys react to inoculations of variola and vaccinia in a similar manner to the human being, and therefore afford valuable means of controlling the results of experiments on the mutual relationship of the two diseases.

4. It is possible to isolate from vaccine (and also to a less extent from variolous) lymph a number of micro-organisms, none of which, however, have anything to do with the specific action of the lymph.

5. These bacteria belong, in great part, to that class which is concerned in the process of suppuration, although others both pathogenic and non-pathogenic in nature may be present also.

These "extraneous" may be destroyed, if present, by the following method of treatment which Copeman, like others, found would preserve the lymph unimpaired for an indefinite period ; indeed, its specific activity, so far from being destroyed, may actually become intensified ; the lymph is mixed with a certain proportion of (75 per cent.) glycerin in distilled and sterilized water prior to storage in capillary tubes, which latter also had been sterilized by heat. There seems to be no doubt but that the glycerin method of storage of lymph offers the easiest solution of the problem of securing an aseptic vaccine virus.—*The Journal.*

DIPHTHERIA IN NEW JERSEY.

OWING to the alarming prevalence of diphtheria in Burlington, the Board of Health has ordered that all public schools be closed. Consequently the doors were shut for an indefinite period. The infant department of one of the Sunday-schools has also discontinued its sessions for the present. There have been thirty cases reported to the Board of Health, seven of which have resulted fatally. Every possible measure is being taken to stamp out the disease. Twenty-one cases of diphtheria have been reported to the Trenton Board of Health within four days, and of these four have proved fatal. There were forty-eight cases of the disease reported last month.

DIETETIC FADS

MEMBERS of the medical profession, like other men and women, are human, and hence subject to the same laws which prevail among other classes of human beings. It must be granted, however, that the superior knowledge of physiological laws and human nature gathered by the scientific researches and the large experience of the medical profession, naturally secure to the physician partial immunity against certain phases of intellectual waywardness, so to speak. This accounts for the fact that no class of men have done so much to deliver the world from the shackles of superstition as have medical men. But the root of superstition still lives in the mind of even the medical man, planted there by the persevering and never-forgetting hand of heredity. This breaks out now and then under the guise of medical dietetic fads.

These are so numerous that space will not permit even a mention of them here, but we wish to sound a note of warning against a few which have prevailed within the last score of years.

At the outset, it may be stated that every practice which has been degraded to the level of a fad really possesses some intrinsic merit, and becomes damaging only when it comes to be worshipped as a sort of fetish in routine practice. As various exclusive dietaries have been proposed, the writer has made a trial of them, abundant opportunity for which has been afforded in the management of a large number of chronic invalids at the Battle Creek Sanitarium, and has endeavored to make a careful study of their merits and demerits.

Among the most conspicuous examples of dietetic fads may be mentioned the "milk cure," the "grape cure," and the "lean-meat cure." Without going into the full details of these various so-called cures, let us look at each of them in the light of modern physiological research.

First, let us consider the "milk cure." Just where and when this dietetic fad originated we do not know, but having received the endorsement of some eminent scientific authority, it rapidly won its way into popularity ; and at the present time, a milk diet in typhoid fever and consumption, an exclusive milk diet in acute inflammation of the kidneys, a skimmed-milk diet in diabetes, and an exclusive milk and cream diet in the early stages of rest-cure, have come to be routine methods in the practice of many physicians.

In undertaking, many years ago, to employ an exclusive milk diet, the writer encountered this complaint on the part of patients, "Doctor, milk makes me bilious." With the information which we at that time possessed, nothing could seem more absurd than that a natural, simple, fluid food like milk should cause biliousness or any disorder of the liver, so we went on prescribing milk, notwithstanding the protest of our patients, whom we endeavored to cajole out of what we supposed to be their whimsical ideas respecting the unwholesomeness of milk. After many experiments at the expense of our patients, and several years' observation, we arrived at the conclusion that certain persons really did possess an idiosyncrasy against milk. The reason for this idiosyncrasy, or in what it consisted, we did not pretend to understand.

Since Professor Glenard has called the attention of the profession to the great frequency of dilatation of the stomach, resulting in stasis of the food contents in the process of digestion, and since Professor Bouchard has shown that decomposition begins when food is retained in the stomach for more than five hours, we can understand why it is that milk so utterly disagrees with certain persons. Glenard interdicts milk altogether for persons suffering from dilatation of the stomach, his reason being the readiness with which casein undergoes putrefaction and decomposition when retained in the stomach for a period longer than the normal.

Milk is most readily digested in the small intestine, and is especially adapted for use by very young animals, whose stomachs retain their fluid contents but an hour or two at the most. The biliousness arising from the use of milk is not due to the direct action of the milk upon the liver, but to the development of microbes and ptomaines in the stomach, the foul condition of which is indicated by the coated tongue and odorous breath so commonly resulting from the use of milk in persons who complain of being made bilious by it. The absorption of ptomaines from the stomach burdens the liver with an unusual amount of work in the action of its poison-destroying and eliminating function, so that both the stomach and liver suffer, and not only these organs, but the entire body, through the flooding of the tissues with the toxines and ptomaines resulting from the decomposition of the casein and albumin of the milk in the stomach.

The germicide properties of lactic acid render buttermilk, kumyss, and kumyzoon less likely to disagree with persons whose stomachs retain their contents too long, but milk in these forms acts like a veritable poison, which it in fact is, in consequence of the poisons developed from it by the action of various gelatine liquefying germs found in the stomach.

In view of these facts, it is scarcely necessary to point out the danger of prescribing milk indiscriminately in every case of typhoid fever, in acute inflammation of the kidneys, and in all cases of diabetes or of any other class of maladies. In fact, it would seem more rational to discard milk altogether as an article of diet in these cases; for Bouchard has shown by means of a sufficient number of well-studied cases to give authority to his statement, that in typhoid fever, in Bright's disease, and in consumption, dilatation of the stomach is present in more than half the cases. According to the writer's personal observation upon this point, which covers a considerable number of cases, dilatation of the stomach has been found in more than three-fourths of the cases investigated. It thus appears that milk is less likely to agree with cases of the class mentioned than with many others, owing to the peculiar disability of the stomach which exists in conjunction with these maladies, and not incidentally, but as an important etiological factor, as Bouchard has clearly shown.

The writer very distinctly remembers a number of cases of typhoid fever in which he feels very confident that the thick coat upon the tongue and the horrible breath of the patient were more directly attributable to the milk diet to which he confined the patient, in spite of his protest, than to the disease itself.

It must be granted that milk is preferable to meat, meat juices, beef-tea, meat broths, meat extracts, and the various other meat preparations formerly in vogue; for, as an eminent French professor recently remarked, "Beef-tea is a veritable solution of ptomaines," and meat not only contains ptomaines, but encourages their development in the stomach to a far greater extent than does milk, especially in a stomach like that of a fever patient, which fails to secrete a sufficient amount of hydrochloric acid to disinfect and preserve the contents of the stomach during digestion. How much more sensible as a diet in typhoid fever, for example, is the ptison of Hippocrates, or water gruel made from barley, very thin at first, but made thicker and more substantial in nutritive qualities after the early days of the fever have passed, and the necessity for sustaining the patient's strength is increased.

In acute Bright's disease, what is required is not milk *per se*, but an abundance of fluid, and a diet which is free from ptomaines and will not encourage their development. Such a diet is to be found in various preparations of grains, in fresh and stewed fruits and fruit juices, and in such oleaginous seeds as the almond, the hickory-nut, pecan, and filbert. Two things of the greatest importance in these diseases are to prevent the introduction of ptomaines into the blood from without, and to lessen as much as possible their formation in the body, and aid their elimination by supplying the system with an unusual amount of water.

The "grape cure" has never become a very extensive fad in this country, but in parts of Switzerland, and we understand also in California, at certain seasons of the year the vineyards may be found thronged with invalids who are required to swallow from ten to fourten pounds of grapes daily as a dietetic antidote for most perverse morbid conditions. Of all the dietetic fads with which we are acquainted, none are, perhaps, more harmless than the grape cure. Grapes are the most easily digested of all fruits. With peaches and strawberries, they constitute a trio of the most excellent fruits produced in temperate climates, as regards digestibility. With the skins and seeds excluded, they present to the stomach a pulp which is readily permeated by the digestive fluids, and which affords a considerable amount of nutritive saccharine matter, together with an abundance of the purest water, although the amount of nitrogenous material afforded is quite too small to sustain the daily nitrogenous waste. There is probably no food which may be introduced with greater impunity into a dilated and sluggish stomach; nevertheless, it must be easily recognized as a fact, that the introduction of so great a mass of food of any sort must be to a certain extent detrimental to a stomach whose walls are already relaxed and attenuated by disease.

To Dr. Salisbury, of New York, formerly of Cleveland, is doubtless due the honor of having organized and introduced to the world the "lean-meat" fad. Dr. Salisbury based his recommendation of lean meat as an exclusive article of diet upon the absurd idea, of which we hear very little nowadays, that Bright's disease, consumption, and a number of other constitutional maladies are due to the development of yeast in the blood, which he attributed to the presence of starch in the food. Dr. Salisbury and his followers delight in exhibiting through the microscope to the credulous and uninformed the so-called masses of yeast, which, however, are really disintegrated white blood-corpuscles, the result of rubbing the specimen of blood between two cover-glasses or the cover-glass and the slide, so as to break up the white corpuscles before examining with the microscope. But notwithstanding the absurdity of the theory upon which the lean-meat diet is based, and the ignorance with which its claims are supported, it has, nevertheless, come to be a real fad.—*Mod. Med.*

AUTO-INTOXICATION AND SKIN DISEASES.

Blaschko (*Berliner Klinik*, September, 1895) discusses the present position of our knowledge regarding this question. The laity cling to the old humoral pathology which attributed skin affections to dyscrasia, improper mixing of the blood fluids, and, though the local origin of many of them has been proved by Hebra and his school, there can be no doubt that a large number of such diseases arise from internal causes. Among these causes, one which has of late been put prominently forward is auto intoxication. According to Bouchard, this is a perpetual danger in the healthy subject whose organs, as well as innumerable micro-organisms in his alimentary tract, are continually forming chemical substances of which any excess or abnormality in production is liable to lead to toxic effects. These are still more likely to result from the formation of abnormal chemical products under the influence of disease. Bouchard and other French authors include among the toxæmias all affections resulting from acute or chronic putrefactive processes in the alimentary canal, taking dilatation of the stomach as the type of chronic auto-intoxication. Various skin diseases, particularly acne of the skin with reddening of the tip of the nose in young girls, are attributed to gastrectasis; but Bouchard uses his term in a very loose way, ignoring the recent researches and the laws deduced therefrom as to its exact diagnosis. The nature of the "autotoxic dermatoses" can best be elucidated by the study of such "toxic dermatoses" as the drug eruptions. Of these the main characters are as follows: (1) Certain drugs produce by preference certain eruptions, but one and the same substance may cause very various manifestations, of which potassium iodide affords a very good example. (2) The same eruption—for example, urticaria—may result from the action of the most different medicines. (3) These eruptions are comparatively rare, due to idiosyncrasy, which may be natural, or result from the continued use of the drug, which in other instances establishes a protective habit. (4) They are generally acute, and belong to the groups of erythematous and exudative affections; more chronic outbreaks are rare, and genuine eczema and psoriasis are unknown outside the true parasitic affections. (5) They appear alike in whatever way the drug was administered, and are therefore due not to reflex action but to the direct toxic effects of the poison in the blood. Similar eruptions may result from the presence of any foreign substance in the blood; thus, the emptying of an echinococcus cyst into a branch of the portal vein has set up urticaria. In such a case the boundary between toxæmia and auto-intoxication may be hard to define; somewhat akin are the rashes so often observed after the operations of serumtherapy. Auto-intoxication is also dependent upon idiosyncrasy; in the cases under consideration there is loss of power of resistance to a poison acting on the cutaneous circulation. It is possible to enumerate groups of skin affections which probably originate from poisoning by bacterial proteids (=auto-intoxication.) Among erythemas.may be reckoned: (1) The typical acute exanthemata, morbilli, rubeola, and scarlatina, which approach nearest to the toxic erythemas. In variola, varicella, and the other acute exanthemata there is also the local action of the micro-organisms on the skin to be considered. (2) Erythema in the course of acute and chronic infectious diseases, such as cholera, septicæmia, etc. Here again the affection may be complicated by the presence of bacteria in the skin. (3) The erythema of uræmia and of icterus. (4) Dermatitis exfoliativa, of which Blaschko quotes a case which he believes to have arisen from auto-intoxication. In all these cases substances have been found in the urine indicating the occurrence of putrefactive changes in the intestine. Urticaria in many cases undoubtedly arises from auto-intoxication; here again idiosyncrasy plays a most important part. Acne vulgaris is probably unconnected with digestive troubles, with which, however, acne rosacea is usually associated. That the latter is really an auto-intoxication can hardly be regarded as proved when the uncertainty of its relation to the alimentary tract is considered. Still more uncertain, in spite of the popular views as to "impurity of the blood," is the autotoxic origin of eczema. Some have considered this proved by the local reaction of tuberculin and other materials (especially amines) injected into the circulation of patients suffering from lupus. Blaschko, however, points out that this reaction does not occur in the healthly skin, and is strictly comparable not to the development of eczema, but to the appearance of an acute exacerbation in the course of an already established disease. In France the old humoral pathology has never become quite extinct, and modern observers, such as Quinquaud and Gigot-Suard, still attach too much importance to the toxæmic origin of skin affections. Tommasoli has also written a book in which he attributes an enormous number of cutaneous diseases to auto-intoxication, basing his views on the daily estimation of the various constituents of the urine in 8 cases, a method which cannot but be reckoned fallacious when the enormous number of substances in the circulation which may act upon the skin is considered. Blaschko concludes that the number of skin diseases of which auto-intoxication is the proven cause is very small, but that it is a possible factor in the production of many more, whose origin can be definitively established only by the combined efforts of dermatologists, clinicians, and physiological chemists.—*Brit. Med. Jour.*

Department of Physical Education.

WITH SPECIAL REGARD TO THE SYMMETRICAL DEVELOPMENT OF THE BODY.

Edited by J. Clark Slay, M.D.

(NEW YORK.)

PHYSICAL EDUCATION.

Education was formerly regarded purely as brain culture, that the mind depended entirely upon the cultivation of the brain, as if it were a distinct and independent part of the body. Since, however, it is now known that the growth of the intellect depends upon the development of the nerves, muscles, viscera, and other organs as well as the brain, the term education has a broader significance. But, notwithstanding that it is now well understood that the full and satisfactory growth of the mind depends on the symmetrical development of the body as a whole, physical education is still considered subservient to mental culture instead of being the fundamental and necessary part of universal education.

Complete and harmonious growth of intellect is made possible only by the healthy performance of function of all the organs of the body, the least function of the entire organism not being without its influence upon the brain. The healthy performance of function of an organ depends mainly upon its development, and of the entire organism upon its symmetrical development. The correct physical development of the body, however, does not rest solely with a generous supply of nutrition under favorable hygienic environments, but also upon exercise, systematic exercise that brings into activity and symmetrically develops every part of the human anatomy.

Physical education as scientifically taught is of a recent origin—previous to which time it was generally conducted by men having but little or no knowledge of anatomy and physiology, and consequently without any regard to health, mental culture or symmetry of body. The physical development of special muscles or parts of the body, so as to be able to perform certain feats with but little attention to the rest of the organism, is a dangerous procedure. By the over-development in certain directions and the complete absence of it in others the entire system is thrown out of proportion, which often leads to disease, and not infrequently ends in death. The mere mention of physical culture to these men directed their minds at once to the bones and the large muscles directly attached. The viscera and other organs were not taken into consideration, if, indeed, they were even thought capable of improvement, hence healthful culture was out of the question.

The bones and muscles of the arm form no exception in respect to their development from the rest of the body. Place this member completely at rest for a long time, and, as every one knows, it will gradually waste away and become helpless; but the more exercise the arm performs the more will it develop and the stronger will it grow, provided, of course, it is not overtaxed. The same is true of every other part of the body. Strong lungs do not come from rest, but from exercise that incites full, deep breathing, even rapid breathing from vigorous exercise. Strong stomachs result from eating food that is difficult of digestion as well as that which digests easily. Predigested foods are intended for temporary use only by the sick. Feeble circulation as well as many diseases of the heart are benefited by the judicious climbing of steps or mountain sides.

Every part of the body is capable of development, and many disproportions permanently corrected by some special form of exercise. To so great an extent has physical development been neglected, or abused, that its scientific application is frequently seen to remedy defects and perform cures that have resisted all other known treatments.

"MENS SANA IN CORPORE SANO."

AN INTERVIEW WITH MISS CHARLOTTE E. MAXWELL,

Of St. Botolph Gymnasium, Boston.

By Mary B. Willard.

"Think upward and be light." The command, given in a clear, incisive, but reasonable and kindly tone, suggests an Institute of Psychology rather than a gymnasium; but it was given by Miss Maxwell in the Swedish Gymnastic Club at Reigate Priory, to a party of girls who were just about to take a forty-six-inch jump. It sounds psychological, it is true, and with the soundest of reasons, for gymnastics properly based and properly taught must be a matter of mind. Especially is this true of the Swedish system taught by Miss Maxwell, who is a pupil of Baron Nils Posse, now of Boston, and one of the first class graduated by his school.

Miss Maxwell came to England by invitation of Lady Henry Somerset, and was for several weeks her guest at Eastnor Castle, after which she superintended the fitting up of a gymnasium in the Priory at Reigate, where she had a number of classes during the summer of 1895, the most interesting of which was made up of the three well-known White Ribboners—Lady Henry Somerset, Miss Frances E. Willard, and Miss Anna A. Gordon. In addition to classes from the families of Reigate, Miss Maxwell taught a number of pupils who receive their instruction through the courtesy of Lady Henry Somerset. One of these classes included the stenographers, another the girls of St. Mary's Home, founded by Lady Henry, and a third the leading lady clerks in the shops of Reigate.

It will be interesting to White Ribboners to know that Miss Maxwell's mother was one of the founders of the W. C. T. U. of Boston.

I asked Miss Maxwell for some information concerning her system of gymnastics, and this was her answer:

"Our system is based on the Ling principles of physical culture, as they are embodied in the national school system of Scandinavia, the results of which are seen in the splendid physique of the men and women of the North."

"And how does one prepare to teach this science?"

"This Swedish system of gymnastics has been wrought out and derived from mechanics, anatomy, physiology, and psychology. Hence all of these branches of science enter into the course of study, which occupies two years, and embraces both educational gymnastics and medical gymnastics. The first, of course, is used in schools and the regular gymnasium; the second is applied to pathological cases, also malformations, largely by massage. Here in the Priory gymnasium I am using only the former with my classes."

"How do you proceed with a class of raw recruits?"

"First they must be taught the fundamental standing position, with the feet at an angle of ninety degrees, hips and shoulders back, chest and head high, chin drawn in. My method, and the one I was taught, is to begin every lesson with the head; the command is, 'Head backward bend—upward stretch!'

"Then follow a few general introductory movements for control of the body. The exercises follow in a regular sequence, no matter how far advanced a pupil may be, and this sequence is the kernel of the whole system. For instance, every lesson begins and ends with general exercises, and has specialized lessons placed between. We begin after a simple introductory exercise with arch flexions, heaving movements, and balance movements; next take up special work, shoulder-blade movements, abdominal exercises, and lateral trunk movements; last come slow leg movements, leaping and respiratory exercises. This order is unvarying, while the movements under each head may be never twice alike, for there must be progression, and progression here follows its own law, viz.: from the general to the special, and back again to the general. In the Kindergarten the movements are general as to effects; with the older child they become more specialized till physical culture has been acquired; then, at last, the gymnast turns to general exercises in the form of sports and athletics."

"And how did you, yourself, come to take up gymnastics as a profession? Was it the philanthropic interest to secure better physical development for women in the hope of sounder minds, when sound bodies should be the rule and not the exception?"

"No, it was not philanthropy chiefly that induced me to take up the study, but the thought that since I must do something to make life comfortable for others as well as myself, it would yield me the greatest returns both physically and financially, at the same time conferring inestimable blessing on others; for what is so essential to the right use of life, to say nothing of its enjoyment, as a thoroughly available physique?"

"And have you found in the Swedish system of gymnastics all you hoped for physically?"

It seemed a little superfluous to ask the question of a woman who at first glance gives one the impression of having her entire body under the same control as most of us have our hands and fingers.

"It would be difficult for me to tell you all I have found in it—but suffice to say, I believe no other system takes cognizance of so many of the truths of being. In the first place it deals with the pupil as an individual; you yourself are the unit, without reference to your neighbor, and the aim of physical culture is to round your particular body to its harmonious and well-balanced whole, where the action and development of one part is proportionate to that of all the other parts, and all are under the perfect control of the will. We do not try for big, swelling muscles in legs or arms, but that every muscle of the entire body shall play its rôle in the system with the same freedom and facility as every other muscle."

"But you surely aim to increase the measurement of the chest, do you not?"

"Everything with us is subordinate to the best posture of the chest and the fullest expansion of the lungs. There is not a movement into which this does not enter. Every movement is really a breathing exercise, and an extra supply of oxygen is thus introduced into the body by this means. We regard good breathing capacity as of greater value than muscular strength."

"Would you advocate these exercises for young children?"

"Most certainly, but with the carefulness that a trained teacher must always exercise. There is no reason why a child may not be so trained physically that it shall grow up to man or womanhood with a perfectly normal figure, and with all the strength and grace of movement that Nature in her plan designed. Nobody ought to be small, low of stature, crooked in a single bone, unequal in the two sides of the body, or left-handed, or round-shouldered, or imperfect in a single item of physique. Here, for instance, if a child is made to practice hanging by these stall bars and arch flexions (the bending of the trunk backward or forward) for a few minutes every day, there is no reason to fear that he will become a low-sized man, even though all his ancestors have been small men and women. And there are other exercises and appurtenances that will just as surely prevent the child's becoming unequal in the use of his hands or his feet, or malformed in the slightest degree. If, however, malformation already exists medical gymnastics is applied to remove it, with the utmost success."

"What do you mean by this—that deformities may actually be removed?"

"Curvatures of the spine, uneven hips and shoulders, drooping heads, bow-legs, knock-knees, all have been entirely removed by the skilful employment of medical gymnastics."

"Not every home has or can have its gymnastic apparatus. How would you deal with children or persons who do not have access to a well-fitted gymnasium?"

"Some of our best work is done in private houses, in a dining-room, for instance, where we have only chairs, a rope possibly, and a stout pole. I have seen excellent progress made with a rope and a broomstick. This I consider one of the best features of the system, its adaptability to every situation and environment. Of course we are able to do more if we have apparatus of one sort or another, yet there are free-standing exercises that no apparatus in the world can ever substitute. We believe that these free exercises develop co-ordination and general physical culture, while the movements of applied apparatus cultivate force and localized effects."

"I noticed by your command to 'think upward' how closely you connect mind with body in your system."

"Yes, the fundamental principle, according to Ling, is the oneness of the human organism and the harmony that ought to exist between mind and body. All our movements being guided toward certain ends, one of those ends is the psychological, which with the physiological and physical receives its due share of attention. For instance, you will find it laid down in the text-books on general kinesiology that respiratory exercises produce the psychological effects of exhilaration and moral repose; shoulder-blade movements produce localization of thought, concentration of mind; heaving movements, consciousness of power; leaping and vaulting, courage, and appreciation of effort, with presence of mind. The virtuoso with his violin, the leader with his orchestra are only symbols of what we believe every human being ought to be with respect to his own organism. And every nerve and fibre ought to respond as musically and sympathetically to his will as the chords and cadenzas of the instruments to the skill of the artist and director."

"And now that you have so clearly demonstrated and explained what the system has done for you and your pupils physically, you said, you remember, that in entering on your profession you had also financial aims. Is it fair to ask how can any young woman, who has her own finances to look after, build her hopes on financial success?"

"The science and practice of educational gymnastics has no royal road to success. The person who will succeed must have natural inclination for the work. A good constitution is necessary in this training, and is often developed where it does not at first exist, indeed there are very few qualifications that one would lay down as especially needful which are not equally demanded in any other vocation. To be successful—which means, of course, to be able to impart to others a knowledge of the system in such measure as to insure to them health and perfect development of body—one must have far more than the knowledge of it. Courage, ability to make people believe in you, to attach people to you, are absolutely necessary. With thorough training and these qualities of character, success in its best and broadest sense is as certain as it can be in any worldly scheme, and financial success is abundant. One may reap ample reward in money, besides a far more satisfactory recompense in the gratitude of those one is able to help.

"After four years of teaching in the Posse Gymnasium, Miss Deane (a classmate and companion teacher) and I started the St. Botolph Gymnasium in Boston, and we have had every reason to be satisfied with the number of our pupils and classes. It is a delightful profession," she added enthusiastically, as she stepped with a lithe, free movement across the room to where her Priory class was waiting further orders.

"Left foot sideways forward, and arms upward stretch! Trunk to the left—turn! Backward bend! Upward—stretch! Forward—turn!"

BICYCLING FOR WOMEN AND BICYCLE SADDLES FOR WOMEN.

By C. W. Townsend and James R. Chadwick.*

The following questions were asked by Dr. Townsend from a number of female physicians in Boston:

1. Do you consider bicycling good for the average woman?
2. Have you seen any harm from it? If so, what?
3. Would you advise it in any form of uterine disease?
4. What is your personal experience, if any, with bicycling?

He classified the answers as follows:

1. All but one stated decidedly that they considered bicycling of value to the average woman, some giving the following qualifications:

    (a) If used in moderation, both as to length of ride and speed;
    (b) If properly dressed;
    (c) If in proper posture;
    (d) If at proper times;
    (e) If protected from falls while learning.

2 Nine had seen no harm from bicycling. Four more had seen harm only from excessive use in the form of general fatigue and jarring of the head and spine. One had seen serious ovarian trouble, directly due to riding long distances, or during or near the menstrual period. Another reports a case of renal hemorrhage; a case of profuse metrorrhagia; a case of oöphoritis, with anteflexion, and intense dysmenorrhea, in patient hitherto entirely healthy, and a case of miscarriage. Another physician has seen uterine congestion, and dysmenorrhea in a patient, with no previous history of pelvic trouble.

Another has seen harm in case of extensive adhesions and contracted ligaments, where there were active inflammatory processes present, and in one case where there was small subperitoneal fibroid in the uterine wall.

3. The question, "Would you advise it in any form of uterine disease?" was answered in the negative by two only. The remainder had recommended the exercise, or might recommend it in suitable cases.

The majority limited the exercise to chronic cases, especially when the circulation was sluggish and the muscular system relaxed; cases of uterine neurasthenia, dysmenorrhea, amenorrhea, due to chlorosis, moderate displacements, and imperfect development.

4. It is interesting to note that these favorable criticisms were not obtained from bicycling enthusiasts, as only one had used a bicycle herself.

These replies cover the field very satisfactorily, showing that the bicycle is of great value to the average woman, even to the woman with various forms of uterine disease. They also show that the bicycle, when improperly used, is liable to do harm.

The bicycle has been compared with the sewing-machine; as well compare mountain-climbing with exercise in a tread-mill. The differences are great, as indicated thus:

BICYCLE.	SEWING-MACHINE.
Out-of-doors.	**Indoors.**
Mental recreation.	**Monotonous task.**
Body erect.	**Body bent over.**
Increased circulation.	**Stasis of blood in lower limbs and pelvic organs due to bent position.**
Vision not concentrated.	**Eyes fixed on fine points.**
Exercise consists of sweeping movements of legs and thighs, together with the use of all body muscles in swaying. Motion of balancing, together with more or less use of arms.	**Exercise limited to restricted movements of lower legs.**
Exercise demands deep inspiration.	**Exercise so slight that deep inspiration not required.**

Dr. James R. Chadwick states, in regard to the present form of bicycle saddles for women, that no effort has as yet been made to adapt the saddle to a woman's anatomy. The bicycle saddle for men seems to have been modelled upon the saddle that was found suitable for men riding upon a horse, being merely reduced in most of its dimensions.

This has answered most of the requirements, though often found to strike against the prostate gland or the pubic arch. When women began to ride, they were given the same saddle, regardless of the fact that behind the pubic bones are the external genital organs so prominent as inevitably to rest upon the anterior projection of the saddle.

---

* *Boston Med. and Surg. Jour.*, cxxxii., No. 24.

The result has been that women have generally had great difficulty in having the saddle so adjusted as to be rendered comfortable; in other words, to avoid pressing unduly upon the vulva. The author continues:

"My inquiries have not enabled me to form definite conclusions, but have made evident the facts that: (1) the saddles in most use require many adjustments to be comfortable to the generality of female riders; (2) that some of the saddles are absolutely unfitted for the use of women; (3) that the teachers have no definite ideas by which they can adapt the saddle to the use of women.

"Now let us consider briefly in what respect the saddle needs alteration to fit it to the anatomy of woman. In the first place, a woman's pelvis is broader than a man's, and the tuberosities of the ischia are further apart in woman than in man; consequently the width of the rear portion of the seat needs to be greater. No such provision has been made. This is a matter, however, easily corrected when attention is called to it. Secondly, the anterior projection of the saddle must be tilted downward so that it will not strike against the vulva. This, however, requires the most delicate adjustment, for if the saddle is tilted too far the slope of the seat causes the rider to slide forward so as to rest almost entirely upon the anterior projection, and so defeat the object of the tilting. Again, the seat may be shifted backward and forward upon the frame without tilting. When shifted backward, the action of the leg upon the treadle tends to push the body backward, and thus to insure that the ischia shall rest upon the saddle; but in this location the muscular action of the legs is less effective, which renders the work of propulsion greater.

"From the foregoing it is evident that the adjustment of the present form of saddle to women is attended with great difficulty. The question, therefore, arises, Is the anterior projection of the saddle essential? I cannot pretend to answer this question; but it seems to me that experiments should be made to dispense with this feature of the present saddle if possible. The problem is, whether without the anterior projection the seat of the rider would be sufficiently secure. The trouble is that when the leg is straightened and the treadle at the lower point of its circuit, the thickness of the thigh tends, by pressing against the anterior margin of an oval saddle, either to lift the tuberosities of the ischia from the saddle or to drag them forward, so that after a jounce they will not descend upon their proper place, and a secure seat will thereby be lost, or the skin be chafed at the junction of the thigh and the ischiatic region. The feasibility of such a saddle as this can only be determined by experiment, and should be made before women are generally allowed to ride the bicycle.

"In conclusion, I would express the opinion that bicycling is a most desirable form of recreation and exercise for women, and that my only purpose in bringing it up for discussion on this occasion is to stimulate the inventive minds of its advocates to devise a saddle which shall not inflict local injury or discomfort upon women riders."—*A. M.-S. Bul.*

A PAGE FROM THE HISTORY OF ANCIENT MEDICINE.

By P. C. Remondino, M.D.

At the dawn of our civilization the practice of medicine was at times about as risky an occupation as that of a laborer in a powder-mill, and the man of science in the early days of Greece was apt to fall into hands as little considerate of his sensibilities as were the aborigines of Oregon toward an unsuccessful medicine-man. Royal physicians have not always had it all their own way—any more than royalty itself. It is well known that the physician of Louis XI. often wished himself off in some swampy wilderness herding hogs or catching edible frogs —especially when Louis became a little suspicious as to his loyalty and integrity. The court physicians of the times of Louis XIV. also had an uncomfortable existence—they did not in reality enjoy the ordinary peace of mind or of conscience, nor the physical happiness, of a fourth-rate inn-keeper. Even in our times, court physicians do not have such jolly good times—at least, so must have thought one of the medical attendants upon the late Victor Emanuel, who did not propose to be treated like an old woman by having his chest encased in a flaxseed-meal poultice. The king was impatient and a little irascible at all times, and unmanageable when sick; and when, under the restlessness caused by a congested lung, he found the doctors industriously engaged in adjusting a generously proportioned poultice to his chest, his warrior spirit rose to the occasion and, grasping the poultice, he dropped it with some emphasis on the nearest bald-headed medical man. Zimmermann found as unreasoning and irascible a patient in the great Frederick, and no doubt the honest and practical old Hanoverian physician would have liked to divest the king of his royal prerogatives and tumble him into some hospital ward where he could have treated him in a plebeian and rational manner. Old Napoleon was full of hard common-sense in these matters; when the distinguished accoucheur in attendance on the Empress Maria Louisa (overcome by the gravity of the case and some dreaded complications, as well as by the rank of his august patient) imparted his fears to the emperor and apologetically suggested that it might become necessary to do so-and-so, he was much surprised to hear the practical emperor order him to never mind *the empress*, but to go at it as if she were the poorest shopwoman of the faubourgs, and save *the woman*. Napoleon knew that in a case of confinement it was an accoucheur that was wanted, and not a courtier. That was the way Esmarch treated the Emperor William when Nobling filled his tough old imperial majesty with duck-shot; and that was the manner, he hinted, that should have governed the treatment of the lamented Garfield—he should have been treated with the same singleness of purpose that would have characterized the care of a private soldier in an outpost hospital. The physicians of the court of Victoria's early reign who lost place and reputation by honestly standing up for Lady Flora Hastings also wished that they had never seen a court or waited on royalty.

Herodotus relates that on one occasion the great Darius met with an accident from which he emerged with a badly sprained and very painful ankle. At that period of the world's history the physicians educated in the old Egyptian temples were much sought for by the rulers of Western Asia, and each court possessed a number of these physicians skilled in the various specialties; and no sooner did Darius reach his palace than the Egyptian men of science then at the Persian court were called to his assistance. Whatever great medical learning the old Nile temples may have been able to dispense, great skill in all the rational treatments of sprains does not seem to have been included in the curriculum, as King Darius's suffering increased and the poor monarch could find no rest, to the great perplexity and discouragement of the Egyptians. As the outlook became gloomier and the pain more severe, Darius began to have fears that he would be permanently disabled. At this juncture he was informed by some of his household that in the prisons there was then confined a Greek who was said to know something of surgery, as he had held the position of physician to Oretes, a former governor or king of Samos, whom Darius had dethroned and caused to be put to death. This prisoner was none other than Democedes, an illustrious Greek physician, but a native of Crotona, who, in the confusion and in the general collecting-in of the slaves and chattels of Oretes, had somehow become mixed with these latter, and in their company brought to Susa along with the rest of the plunder. A common slave stood some chance of again seeing his country, but good physicians were so rare and in such demand that when a king ran across one he generally appropriated him and took good care that he should not go astray; and the chances for any reputable Greek physician ever escaping from the Persian court were not very numerous. Democedes knew this full well, and had accordingly disguised his position to the best of his ability, so that when brought before Darius he in a manner denied his calling and profession; but on seeing the executioners make ready the implements of torture to compel him to own up the truth, out of consideration for his anatomy — which he very naturally did not wish to see disturbed, seeing that nobody but the Egyptians were around to patch him up—at the sight of the torturers he admitted having some knowledge of medicine and surgery, at the same time expressing his willingness to do, as far as his poor skill would permit, all that was asked of him. The sprain was then a week old, and the swelling and throbbing, with excess of pain, had given the king rest neither day nor night, and he was then in the greatest misery imaginable — even for a typical and despotic king. The Egyptian physicians, it seems, were more on the natural-healer order and not very well versed in the other rational treatments of such cases. In accordance with their system they had wrenched, manipulated, massaged, and generally tortured the suffering and irascible king, in their vain efforts to afford relief, and had in consequence greatly aggravated the case, as this was not a proper one for such treatment. Democedes at once applied the warm fomentations of the Greeks, which not only relieved the king of his great pain so that he fell into a much-needed sleep, but in a short time resulted in the restoration of the ankle to its former use. Darius, we are told, was greatly delighted with the gentleness and skill of the Greek surgeon, and when of a sudden the remembrance of the mental and physical tortures to which the Egyptian physicians had subjected him flitted across his mind, instead of instituting suits for malpractice in the Persian courts, with demands for heavy damages—as an American might have done—he simply ordered the whole Egyptian faculty to be immediately crucified.

Democedes was none of your narrow-minded, vain, egotistical, jealous practitioners; neither was he a great stickler for the code of ethics in vogue at the time, which would have prevented him from taking any notice of the degraded and about-to-be-crucified Egyptians — who were just then beginning to think that extracting the fuses from unexploded bombs was a far less risky occupation than that of practising surgery and medicine on the person of a royal despot. Finding that Darius was well disposed and willing to grant him any reasonable request, Democedes generously asked and obtained the pardon of the disconsolate Egyptians. History does not relate what became of these unlucky men, but very likely they were consigned to some obscure position in the royal kitchens, to manipulate the kettles and *masser* the saucepans to their hearts' content.

Professor Osler, of Baltimore, is quoted as saying that without a good store of analytical common sense, the time spent in acquiring a merely technical education is spent in vain. A study of medical biography, ancient or modern, lends support to this view. The noted Greek physicians who flourished some 500 years before the beginning of our era were men remarkable for the uprightness of their moral principles as well as for their modesty and their breadth of view, original powers of observation and research, and common sense. We cannot help admiring in them the utter absence of all "Barnumism," hypocrisy, and love of the fictitious and misleading. Well said Sir John Lubbock, that in the pagan philosophy of the ancients there resided more Christianity than in all our modern theologies. Only imagine the travesty, were the figure and countenance of America's *great* medical reprobate to replace that of Hippocrates in the picture of "Hippocrates Spurning the Wealth of Asia," when the grand old sage refused all the wealth and honors offered by the Persian ambassadors to induce him to leave bleak and poverty-stricken Greece for a residence amid the splendors of the Asiatic court. The spirit of Hippocrates has lived in an Agnew or in a Gross, even in our times; but too many follow in the deceptive footsteps of *the* great reprobate, too psychologically degenerate and morally warped to realize the truth that

> "Corruption wins not more than honesty,"

and too pachydermatous ever to feel the killing frost that sooner or later overtakes the overselfish and the unscrupulous.

Democedes was offered all that a sensual, sordid, and selfish or vain man could appreciate or desire in the shape of wealth, possessions, and honors, would he but remain voluntarily at the court of Darius; he was not, however, either by inclination, cultivation, or temperament a Chicago alderman or a Tammany sub-chief; nor was he a prototype of the Fifth Avenue dude, or of the modern European "noble" in search of a wealthy American wife. As some celebrities of our late Woman's Congress would say, he felt that he had a "mission" on earth to perform, or a "sphere in life to fill," as well as a progeny to father, and the Persian environment was a bar to his high purposes. He therefore made up his mind to get away at the earliest opportunity. Some accounts tell us that he cured the Queen Atossa, the daughter of Cyrus and wife of Darius, of an ulcer of the breast. Through the favor of the queen he obtained from the king the command of a Persian naval expedition intended for the exploration of the Greek and Italian coasts; but no sooner had the ship touched at Tarentum than Democedes, eluding the vigilance of his Persian companions or guards, forsook the command of the ship and proceeded to his native town, Crotona, where he married the daughter of Milo, the renowned athlete and wrestler. Darius's officers attempted the abduction of Democedes, whom they seized in the forum of Crotona, but the citizens rallied to his assistance and beat the Persians off with their clubs.—*Med. Age.*

DISORDERS OF SPEECH.

The cure of Demosthenes from stuttering was no doubt due not so much to the pebbles which he put in his mouth as to an element of his system of treatment which is not so commonly understood. He retired into a solitary place, and to compel his remaining there he shaved one side of his head. He who would break himself from stuttering or stammering must fortify his patience and perseverance by every means which his ingenuity can devise, for he has a most difficult struggle before him. A strong point of the great orator's method was the fact of solitude. It may have been thought that this was to spare the nerves of his friends and fellow-citizens. Nothing hinders improvement more than to engage in ordinary speech. Improvement can only be gained by the slow and deliberate repetition of the troublesome sounds. In the majority of cases stuttering is due to a failure on the part of the vocal organs to co-operate with those of articulation. This may often be corrected by teaching the stutterer to place the organs of articulation in correct position for the desired sound and then concentrate attention on the vowel following it in some simple word. Stuttering and lisping in some cases result from failure to properly arrange the organs of articulation, or to expel the breath from the lungs at the proper time. The physician who can ascertain the cause of stuttering and explain to an attendant the method of cure will have taken the first important step to that end. Sometimes, however, he is able to do vastly more than this. Adenoid growths in the nasopharynx will occasionally cause stuttering. When due to this cause, their removal renders a cure very easy. Lisping or even stuttering may result from an irregularity of the teeth and can be modified by the dentist. Congenital malformation of the organs of speech is rarely the cause of stuttering. It is sometimes met with, however. The tongue is occasionally too short or too thick, but tongue-tie, although by no means a myth, is not nearly so common as the laity suppose. The palate will in a few cases require the aid of the surgeon. Children recovering from serious illnesses, especially such as affect the throat, will sometimes stutter. This result is seen at times in children who have been overworked in school or who have suffered a nervous shock. It may result from general debility, especially in children of neurotic parentage. Constitutional treatment of the conditions causing stuttering will in many cases remove this defect, but not always. In a vast number of cases the cause lies far back in the nerve-centres themselves, and is consequently very difficult to reach and to relieve either by treatment or training.

Stammering is quite similar to stuttering. In stammering it is the syllable which causes trouble, in stuttering it is the letter. Causes are not different and treatment varies in detail only.—*Arch. of Ped.*

HEREDITARY DISEASE OF THE HAIR AND NAILS.

NICOLLE and Halipre (*Revue Internationale*, October, 1895) presented before the July meeting of the French Dermatological Society, a man 28 years old (admitted to the hospital for disease of the finger- and toe-nails) in whom there was marked hypertrophy of the nails, with extreme friability and some suppuration; the hairs were coarse, scarce, and easily broken. The patient, an unintelligent degenerate, belongs to a family in which during six generations there have appeared thirty-six similar cases out of fifty-five individuals. There is no sign or previous family history of leprosy or of hereditary syphilis. In a word, it is an hereditary condition that may be well compared to the great hereditary diseases of the nervous system.—*Medicine.*

THE "BRIEF" IN ITS NEW DRESS.

WE have have just finished perusing the January *Medical Brief* in its new dress. Wisely the *Brief* has not attempted to dress up in disguise. We readily recognized it before seeing its name. While we always thought the *Brief* looked well in its old clothes, we are of the opinion that it makes a much better appearance as now dressed.

We further notice that the *Brief* has grown stouter with age, but it is in no sense of the word corpulent. It is a symmetrical development of solid flesh that comes from good nutrition under favorable hygienic surroundings. And finally we look upon the face of its founder and proprietor. This is a strong, manly face, and while we gaze into it, endeavoring to solve the secret of the great strength and success of the man, we can almost wish it were beardless, that we might have a look at the chin. While we do not believe that the brain resides in the chin, the chin nevertheless is a strong index to the man.

May the *Brief* and its founder live when all the pathogenic germs and antitoxines are dead.

WHAT SHALL WE DO WITH THE OLD WELL?

DR. HARVEY B. BASHORE, of West Fairview, Pennsylvania, says (*Medical News*, September 7): What, then, shall be done with the old wells? We all know that in the absence of a public supply deep tube-wells would be the best remedy. Many, very many, people cannot avail themselves of this source of supply; and the next best thing is to treat these wells after a method devised by Dr. Koch, which is effective, cheap, and greatly lessens the dangers arising from the use of well-water. An iron tube, two or three inches in diameter—with its lower end perforated—is placed in the centre of the well, and the surrounding space filled with fine gravel up to the highest point of water level. This is then covered with sand to the top of the well; and a pump attached to the end of the tube makes a very effective tube-well. All water, in passing through the layers of sand and gravel, is effectually filtered, and the nitrifying organisms change the filth into harmless nitrates. A filter-bed like this removes, too, from 80 to 90 per cent. of the bacteria, and greatly, very greatly, lessens the danger to which all are subjected who drink shallow well-water.—*Med. News.*

THE
DIETETIC AND HYGIENIC GAZETTE
A·MONTHLY·JOURNAL·OF·PHYSIOLOGICAL·MEDICINE

VOL. XII. NEW YORK, FEBRUARY, 1896. No. 2

THE ASSIMILATION OF FATS.

BY SENECA EGBERT, A.M., M.D.,
PROFESSOR OF HYGIENE, MEDICO-CHIRURGICAL COLLEGE, PHILADELPHIA; MEMBER OF THE ACADEMY OF NATURAL SCIENCES.

SOME months ago I was asked by one of my pupils, "What becomes of the chyle after it leaves the thoracic duct?" To my replying that it was passed into and mixed with the blood, came the response, "But there isn't any fat in the blood;" and since then I have been trying to find the solution of some of the questions to which that response gave rise. For, in fact, if we are to accept the analyses of the blood given in our text-books, it apparently has no such content of fat as we should expect after the admixture of a fluid so rich in hydrocarbons as is the chyle; and there are, besides, other reasons which indicate that a certain part of the ingested fat is, for a time at least, metamorphosed and changed in character.

Considering the actual conditions, we know that the fatty portion of our food is emulsified and partially saponified by the combined action of the bile and the pancreatic juice, that its passage into the lacteals is facilitated by the functional activity of the epithelial cells lining the intestinal villi, and that the actual proportion of fat in the chyle may be as much as fifteen per cent. by weight and considerably more than this by volume.[*] Whether the fat is further influenced or changed by the intestinal epithelium,[†] by the peculiar lymphoid tissue within the villi, or by the lymph corpuscles themselves, we are not now able to positively state; but granting this or not, it is not difficult to realize that when the fat of the chyle reaches the superior vena cava it is in a much more finely subdivided condition, and more ready for any physio-chemical change than when it entered the alimentary tract.

Now, inasmuch as the functions and properties of the new gas, *argon*, lately discovered in the atmosphere by Prof. Ramsay and Lord Kelvin, are as yet practically unknown, and as the noted French chemist, M. Berthelot, has shown that this gas has a great affinity for certain hydrocarbons, especially when they are in a so-called nascent state, I should like to offer the hypothesis that possibly one function of this gas is to unite with the fats of our food as they are swept through the pulmonary capillaries and to thus assist in their ultimate metabolism. So far as I am aware, this hypothesis is entirely original with myself, but I have ventured to write to Prof. Ramsay concerning it, and to suggest that he make at his convenience a comparative quantitative test for argon in both inspired and expired air. Such a test would go far to determine the probability of the foregoing hypothesis, but until it is made the suggestion is surely not altogether a fanciful one; for we have the chyle poured from the thoracic duct into the superior vena cava and then almost immediately into the right heart, whence it is driven directly through the lungs, its hydrocarbons, finely emulsified and almost if not quite nascent, separated from the inspired air with its quota of argon by only the thinnest of active tissues. The red blood corpuscles take up their bountiful supply of oxygen; why should not the minute fat globules seize upon the endosmosing argon?

---

[*] Waller's "Human Physiology," 2d edition, pp. 17, 201, 209.

[†] Ewald believes that the transformation of free fatty acids in the diet into neutral fats by synthesis with glycerin is due to the action of the intestinal epithelium. See Dr. L. B. Mendel's article in the DIETETIC AND HYGIENIC GAZETTE, quoted later.

Moreover, why is the chyle kept apart from the other products of digestion and carried separately almost to the very entrance of the right heart, why does it escape hepatic elaboration, and whither goes the fat that seems to have disappeared in large measure from the blood by the time it reaches the aorta and the large arteries?

Let us look at the question from another standpoint. We all know that some of the body fat may have been previously derived from proteid food, and that, on the other hand, with fat in the diet, nitrogenous equilibrium may be maintained with less proteid food than without and proteid substance even added to the body weight, the fat regulating and economizing proteid metabolism. We also note that increase of proteid food increases fat consumption and oxidation. Does this mean that an enlarged nitrogen supply fosters leucocytosis and that the latter facilitates the metabolism of fat? Whether it does or not, it all points to a very close relationship between proteids and fats, as far as their metabolism and assimilation are concerned, and it is entirely conceivable that a portion of our fatty food should become a part of our body proteid. Fothergill has pointed out and insisted upon the great value of fats as constructive agents, and every one of us looks to the hydrocarbons as necessary constituents in the treatment of wasting diseases.

Again, in a recent and interesting article by Dr. Mendel on the utilization of subcutaneously injected fat,[*] he refers to the investigations of Leube in this connection.[†] The latter has shown that when animals had become emaciated from the deprivation of fat from their diet, subcutaneously injected fat might not only be stored up unchanged in the tissues but could also be completely utilized in body metabolism when the supply from without again ceased. And though "Munk and others have shown that fats not normally occurring in the body, *e.g.*, linseed-oil, rapeseed-oil, etc., when absorbed from the alimentary tract, can be detected again in the tissues—*i.e.*, they are stored up as such;"[*] it is to be observed that these are not articles of a normal diet, and that in Leube's experiments his animals were in great physiological need of hydrocarbons and their tissues were under stress to obtain them from any source possible. In other words, we find that the ordinary fats of our diet, such as butter, beef fat, mutton fat, etc., are not normally deposited as such into tissues, but that in their assimilation they undergo a positive change, and that we have no evidence that human fat, with its essential differences, is derived directly from them.

Now, after this rather lengthy dissertation, it seems to me that we can make a practical application of the points discussed therein. As physicians we know the great value of inunctions of fats and oils in many cases, and in view of Leube's experiments we shall probably be the more willing to make trial of subcutaneous injections of the same nature. But, when we attempt to administer our hydrocarbons in either of these ways, will we not be wise and more logical and will we not likely gain something if we first attempt to bring them more nearly into the condition in which they normally enter the lymphatic system from the alimentary tract and in which they are presented to whatever tissues govern their metabolism? Will not less energy be expended and wasted in their assimilation and will there not probably be greater benefit derived from their use?

Drs. Randolph and Roussel[†] observed in 80 per cent. of a series of twenty cases "a notable increase of the fatty matters passed per anum after persistent inunctions of cod-liver-oil," and "venture to suggest, as a provisional hypothesis, that by the continued inunction the circulating fluids became to some extent surcharged with fats, and that, in consequence, a certain amount of the fatty constituents of the food was refused by the absorbent surfaces of the intestine and passed from the body unaltered."

---

[*] THE DIETETIC AND HYGIENIC GAZETTE, Dec., 1895, p. 739.

[†] Leube: Ueber die Verwendung von subkutan injectirtem Fett in Stoffwechsel. *Sitzungbericht d. physik-medecin. Gesellschaft zu Wurzburg*, 1895.

[*] Dr. Mendel's article, *loc. cit.*

[†] *Philadelphia Medical Times*, 1883.

Is it not more likely, in view of what I have written, that this increase of fat observed in the fæces was in the nature of an excretion of that given by inunction rather than a part of that which entered the system by the mouth and remaining unabsorbed by the intestine? In other words, inasmuch as the body received a sufficiency of fat in the natural way (for the cases observed were in "fairly average health"), that driven in through the skin was not needed and would be excreted, if possible, before and in preference to that more perfectly prepared for metabolism.

I would propose, therefore, that where a fat or an oil is to be administered by inunction or by hypodermic injection, it be first emulsified by trituration with such proportions of pancreatic extract and, possibly, inspissated bile as may be necessary to thoroughly break up the globules. In other words, the attempt should be to produce an artificial chyle minus its lymph as nearly as possible.

If this be done, I believe that not only will the fat pass more rapidly through the skin and be taken more readily into the lymphatic system—whence it will in due time reach the blood current and undergo the same experience as does the chyle—but that the results will be more immediate and satisfactory than if it is driven through the skin into the lymph spaces in its crude state —a state in which it never normally enters the system. And just as more heat is to be derived from it exterior to the body when burnt with an atomizing or spraying jet than in a mass, so is it possible that its combustion within the body will be the more perfect and complete.

Another application of this method or suggestion comes into play in the administration of certain therapeutic agents which it is desired to introduce through the skin, but of which hypodermic injections may be objectionable or unadvisable. My friend Dr. Dixon* has lately called attention to the importance of a rational or logical application of certain remedial substances, and especially of that class of a nitrogenous nature, such as the nucleins, serums, etc., which is now receiving so much attention from the profession. Long ago he and Dr. Randolph* remarked on the fact that "in general, drugs in solution in oil (not oleates) are absorbed by the normal human skin with greater or less ease," while "drugs in aqueous solution are not so absorbed;" and they suggested that in order to remove the resistance of the epiderm and, more especially, of the sebaceous secretion, which prevented the absorption of watery solutions, a proteolytic ferment be added to the solution of the drug, which former, being set in action by the body heat, softens and makes the skin permeable to the latter.

Now, a suitable oil or fat having been emulsified and prepared according to my suggestion and the drug being added thereto, we have the double advantage that our drug is in solution or at least suspension in oil, and that we have present the proteolytic ferment to render its passage through the skin both certain and easy; and, moreover, we supply food in an assimilable condition to the system at the same time with the indicated medication, and all with the minimum of disturbance to the patient.

I trust that my readers will feel that there is more than mere theory in these suggestions, and shall be gratified to receive the report of any practical trial they may make of them. As I have already insisted,† in the treatment of tuberculosis and kindred diseases we must pay special attention to the hygiene of the patient, and one part of this is to bring his assimilative and metabolic functions to and maintain them at the highest point. Therefore, we must search out the methods which will supply the material for the exercise of these activities with the least expenditure of vital energy, and it is to this end that I have made bold to offer the foregoing suggestions and to dwell upon them at such length.

---

* *New York Medical Journal*, Dec. 14, 1895.

* On the "Cutaneous Absorption of Salicylic Acid," *Philadelphia Medical News*, 1885.

† "Hygiene and Tuberculosis," *Philadelphia Medical News*, March 23, 1895.

PASTEURIZED VS. STERILIZED MILK.

BY ALBERT R. LEEDS, PH.D.

THE delivery and sale by the milk-dealers of our larger cities, as a regular part of their daily business, of so-called pasteurized or sterilized milk has already grown to considerable proportions. It is therefore important to consider whether this new industry does not also necessitate new sanitary precautions.

In the first place, if the process has not been successfully carried out, the pretence of so doing involves two serious frauds: 1st, The purchaser pays more than is asked for common milk; and, 2d, he is led to misplace his confidence, and even to dispense with a precaution which he would or could exercise himself—that of sterilizing in a home apparatus.

As a matter of fact, my own experience with commercial sterilized milk is that 30 per cent. of it is not sterile.

The necessity is therefore apparent that the dairy commissioners and milk inspectors should enlarge the sphere of their previous labors, and guard the public against these new dangers by making bacteriological as well as chemical examinations.

In this connection a curious reaction in public opinion is worthy of note. As with the cry of Wolf! wolf! in the ancient fable, so with the great hue and cry of Bacteria, which rose to its acutest pitch and vehemence about four years ago. To impress duly the public mind, the countless victims of bacteria should fall stricken on the public highways as if struck by thunderbolts from Heaven. But when to the vulgar gaze nothing manifestly different from what they had been accustomed to happened, a reaction of incredulity set in. Some years ago it was seriously advocated in many quarters that the entire milk-supply should be sterilized in order to escape possible infection from tuberculous cattle, contaminated water, and septic conditions in stable, dairy, and handling. At the present hour a more enlightened public opinion recognizes that both economy and hygiene demand a radically different course, which is a universal system of prevention and prophylaxis, and not primarily a system of cure. The training of dairymen in the needful hygienic requirements of their business and a competent inspectorial supervision of cattle and milk is now the direction in which strenuous effort is being made.

The business in sterilized milk does not grow out of an apprehension that ordinary market milk is or may be dangerous, but from a very limited demand, usually prompted by the family physician, that the infant, invalid, or sick person may have a safer and better-keeping milk. In the winter season this demand is very limited, but in the summer it grows considerably larger.

And when we come to examine more carefully the nature of this demand we find that it is not for sterilized milk rightly and properly so-called, but for pasteurized milk. Almost all the so-called sterilized milk supplied by milk-dealers is used within 36 hours, and it is rarely the case that by reason of transport by rail or ship it must be kept for an indefinite period. The consequence is that the dealers are now installing apparatus primarily designed to pasteurize milk. Even such an apparatus involves as much outlay for plant, fuel consumption, and handling as the consumer is willing to pay for. About 75 minutes is requisite to raise the temperature of the flasks to 160° F., at which temperature they are maintained for half an hour, and then cooled to 50° as rapidly as they can be with safety. All the ordinary pathogenic bacteria are destroyed, and the others which remain do not develop at common temperatures to such an extent as to interfere with keeping for 48 to 72 hours longer than the same milk would keep in a non-pasteurized condition.

Milk thus pasteurized has very little of the taste of boiled milk, or of milk which has been truly sterilized at temperatures considerably above the boiling point. And it exhibits a peculiarity in the way in which the solids are brought together by the process of heating. In milk sterilized above 212° there is a tendency of the separated fat to gather at the top in a semi-buttery, cheesy mass, and for some of the proteids to settle out as a white precipitate at the bottom. This tendency is less marked with pasteurized milk, the separated masses of fat and proteids floating about in even a more diffused condition. Common sweet milk can readily be filtered through ordinary filter-paper. But in one sample of commercial sterilized milk which I examined I found that out of a total of 13.5 per cent. of milk solids 3.79 per cent. was held behind by the filter. A similar sample of commercial pasteurized milk, but containing 13.31 per cent. of milk solids, left in the filter 4.91 per cent.

The best flasks for the purpose are those of Schier. They are cylinders tapering into a cone, and with the rather large mouth closed by a flat rubber disk setting down into a conical seat. After expulsion of air and steam the atmospheric pressure forces the disk very firmly into its seat, and the simplicity of the contrivance permits every part to be thoroughly washed and sterilized. As retailed in such flasks sterilized milk costs 4 cents per half pint.

Viewed from an every-day practical standpoint, the result of a general consideration and trial on the part of the medical fraternity, and also of the general public, has been a decision in favor of pasteurized *vs.* sterilized milk. The grounds—clinical, chemical, and gastronomic—upon which the verdict unfavorable to sterilized milk (except where absolute sterilization is imperative) have been asked for and obtained have already been detailed at length in other places. The use of pasteurization for a part of the city supply and the dozens of contrivances now in use by the dairyman for pasteurizing milk intended for transit to the creamery and in preparing cream for butter-making all point in the same direction.

POPULAR EDUCATION IN PREVENTIVE MEDICINE.

THE Michigan State Board of Health met in regular meeting at Lansing, January 10. The following is in part an abstract of the proceedings:

One of the most interesting items brought to the attention of the Board was that portion of the secretary's quarterly report of work in the office which related to the distribution of the instructive publications of the office to the teachers in Michigan. There being about 16,000 teachers in Michigan, besides many school officers, it was no small amount of work or expense to comply with the act of the legislature which required the State Board to make this distribution of their instructive leaflets concerning the modes of spreading and the best methods for the restriction and prevention of the dangerous communicable diseases. The secretary's quarterly report of work showed that he had sent a circular letter to each county school commissioner, and to each superintendent of a city school, asking just how many teachers there were in the county or the city as the case might be, and offering to send the publications of the office in sufficient numbers to supply each teacher. Of the 76 superintendents of city schools 60 had already replied to the circular letter, and enough sets of publications of the office had been sent to supply one set to each of 686 members of school boards and 3110 city school-teachers. Of 83 county school commissioners 36 had replied to the circular letter, and up to the time of the meeting enough sets of publications had been sent to the county school commissioners to supply 5938 teachers. Sets to the number of 471 have been sent to directors of school districts in Genesee County for members of their school boards, and sets to the number of 160 had been sent to the directors of school districts in Wexford County, one set for the teacher and one for the director. At the recent meeting of the State Teachers' Association 373 sets had been distributed.

The total number of sets of publications sent from the office to teachers and school officers in Michigan was 10,743.

Through the co-operation of the office of the Superintendent of Public Instruction all teachers in attendance at the teachers' institutes since August, 1895, have been supplied with a copy of the law and of the "Data and Statements" supplied by the State Board of Health in compliance with the law.

The secretary's report also showed abstracts of letters from leading educators in Michigan commenting on the new law and congratulating the State Board on this recent departure. It is believed that this is one of the most important branches of the Board's work, and is right in line with its energies in connection with "The Education of the People," just how each dangerous communicable disease is spread and just how these diseases may be prevented.

In remarking concerning the new publication of the United States Weather Bureau, "Climate and Health," President Wells said that he had noticed that the official reports showed that the death-rate from consumption in the Southern health-resort States was about double the death-rate from consumption in Michigan and the Northern States. He also mentioned that many of the health-resort States are recognizing the fact, and their sanitarians are instituting vigorous measures for the restriction and prevention of consumption.

The Board authorized the secretary to reprint a number of educational publications.

The secretary read a letter from health officer Duffield, of Detroit, in which that officer refused to make his annual reports to the State Board of Health in accordance with the law. As the law requiring these annual reports from health officers is specific, the Board directed that in case of any neglect or refusal of any health officer, clerk, or other officer in Michigan to make the reports requested by the State Board of Health and required by law, the secretary is authorized and directed to take all the necessary steps to secure such reports from any such officer.

Several applications for clerkships were presented, but they were not considered; the Board deciding that such applications would not be considered until the report of the committee to draft plans for a civil-service system in the office, or at least until the next meeting of the Board.

By request of Prof. Frank S. Kedzie, of the State Agricultural College, Secretary Baker presented to the Board the question of a "Systematic Study of Natural Waters of Michigan Streams and Wells," including a determination of the amount of chlorine and organic matter in streams above and below cities, and the pathogenic bacteria in the waters. Prof. Kedzie thought the study would be comparatively inexpensive, as much of the work could be done by students under their expert teachers at the many different laboratories in the State. The great drouth during the past few years, and especially during the last year, has forced many people to obtain their supplies of drinking-water from streams. The question as to the safety of such supplies is one which chemists are not now prepared to meet. Are the vast amounts of sewage and other contaminating substances which find their way into streams oxidized and rendered innocuous, or are these substances contaminating the streams and making them a menace to the public health and life? Are the dangers of life in time of drouth greater than at other times? To properly answer such questions, such a systematic study should have been commenced years ago. Should it not be commenced immediately? was the question placed before the Board. The subject was referred to the committee on water-supplies, Prof. Fall, of Albion College, with the request that he correspond with Prof. Kedzie, in order that the work be commenced as soon as practicable.

CALCUTTA MEDICAL SOCIETY.

MEETING of the Calcutta Medical Society, held on the 9th of October, 1895, Dr. Crombie in the chair:

Dr. Maynard read his paper on the "Examination of Malarial Blood."

Dr. Crombie congratulated Dr. Maynard for his excellent paper. Lately he (Dr. Crombie) has not been examining malarial blood very much, but in the few cases in which he did he did not find the organisms. He mentioned a case of hepatic abscess, in which there was a rise of temperature a few days after the operation. As the patient came from a malarious district, the question arose whether the fever was purely malarial or there was another abscess forming. To determine the point he very carefully examined the blood of the patient, but could not find any malarial organisms. Large doses of quinine, however, speedily checked the fever. He remarked that the diagnosis of malarious fever by the microscope was not so easy as some have supposed.

Dr. Dutt then read his paper on "A Few Practical Hints on the Dieting of the Native Sick and Invalid."

Medicinal therapeutics and bactericidal serums have at present so engrossed the attention of our profession that food, as a potent remedy, has fallen very much in the background of scientific medicine. The rapid progress of medicine in recent times has created specialism in every one of its departments. Dietetics alone remain undeveloped into specialism. It sadly wants those researches and investigations which are lavished on other subjects. Among the living men of light and leading in the English profession, there appears no name in connection with the science of dietetics save and except that of Pavy. His thirty (30) years' researches have revolutionized some of the cardinal scientific notions formerly entertained. The glucoside origin of proteid matter throws a flood of light not only on the constitution of proteids, but also on the operations concerned in digestion and several pathological processes. No longer the nitrogenous element takes precedence of all other constituents of food. Carbohydrates are of equal importance; for both carbohydrates and the nitrogenous element are necessary to form a proteid. His discovery harmonizes the processes going on for the production of proteids in both the vegetable and animal kingdoms. Brilliant and of surpassing interest as has been this discovery, it has yet exerted no influence on practical dietetics. As far as the food of the healthy is concerned, there has been a marked progress among the English at home and abroad, coincident with increasing material prosperity; but the food and the feeding of the sick remain almost the same as they were 50 years ago.

Whatever changes were made they were made more in consonance with prevailing pathological views than with the intrinsic qualities of foods. The subject of dietetic improvement for the sick has been in most cases left in the hands of wholesale dealers of food in England. Scientific training in culinary art is not so commonly observed in England as in France and Germany. If any progress has been made in this respect in India, it has been made in connection with the diet of the European sick. Thus you will see that there is a disparity in English medicine between food and drug as remedies, which appears to constitute a serious flaw in its system. Food loses in English medicine its priority as a curative which we observe in the ancient systems of medicine. When English medicine was transferred on a new soil, namely, on a race greatly altered by tropical residence and social changes, a race quite unlike the English in dietetic habits and wholly unaccustomed to stimulating drink, it developed new characteristics and unexpected eccentricities.

As far as that part of it known as preventive medicine or sanitation is concerned, it achieved wonderful success. Its success in surgery has been likewise remarkable, and mainly contributed to its reputation. In purely curative medicine for idiopathic diseases English medicine acted with the swiftness and precision of criminal law, as a kabiraj friend expressed himself once to me. Its stimulating medicines, steeped more or less in alcohol, and its stimulating soup and brandy were sure either to kill or cure. Where it cured it maintained its ground.

It is in the large field of chronic cases that it has proved a failure. Its repeated trials failed to dislodge the kabiraj, who has still an almost undisputed field in these disorders. It appears that this failure has been the result of almost complete ignorance of the dietetic habits of patients and an indifference and disregard for the existing native systems of dietary. If we maintain this attitude of indifference on this important subject, and remain in hope of the advent of a day when the natives of this country will adopt European habits of diet, we are pretty sure that day will never arrive; for, however great may be the dietetic changes in India in course of time, we firmly believe, from historical, climatic, and economic considerations, that the people of India will remain vegetarians in the main.

Exalted as the position of English medicine is now in India, we, as its followers, will not lose either in self-respect or in public esteem if we sedulously study our Hindu systems and supply the long-felt want for our native patients and invalids.

It is with the desire to rouse an interest in the subject, and to call forth that liberalism in scientific view which marked the fathers of European medicine in India, that I have ventured to submit my scanty notes on the dieting of the native sick for your consideration.

The subject has already received considerable attention in the framing of the diet scales for sick soldiers and pauper-sick. In brief, milk and sago or arrowroot form the diet in acute cases; rice with fish or vegetables or flour and *dal* for convalescents. A sufficiency of salt, condiments, oil, or clarified butter is allowed. As to quantity, quality, or the nutritive value of these diets there should be no question, as their regulation has been the outcome of much scientific research and experience. Their simplicity is a strong recommendation for adoption in hospitals and large institutions. But sufficient experience makes us familiar with their defects. The articles of food may be very good, but for want of proper cooking and variation they become less inviting to our patients and fail to secure such salutary results as we desire.

Cooks in charge of the English sick receive some sort of practical education; but for the native sick, any man, however worthless and ignorant, may be considered fit to undertake the duties of a cook, provided his caste is not objected to by patients. Native cooks in charge of hospitals are generally men untrained for their work and unfit for ordinary avocations and callings. As a rule, native food in hospitals is badly cooked, or, in other words, spoiled. It is monotonous, as the cook has no knowledge of varying the food. It recognizes no differences in the dietetic habits of the various races coming under the designation of a native. Neither does it respect the dietetic necessities of particular classes of the sick. No proper supervision can be satisfactory, since most of the subordinate staff of our hospitals are unfamiliar with native foods or object to taste the hospital food. So surprising is the ignorance of the culinary art among our young men that, on the occasion of an experimental cooking for prisoners, I found my hospital assistant fail in cooking *dal*.

Imperfectly cooked sago, rice, or *dal*, badly curried vegetables often escape observation.

I speak from an experience of 23 years of hospital work in Bengal, and I am sure the experience of other officers here present will coincide with mine.

Our hospital cooking and kitchen organization are in urgent need of reform. Proper training of native cooks is essentially necessary, and practical dietetics should form a subject of study to the medical students. Food and feeding form an essential part of therapeutics, and should receive as much attention as they have done in France and Germany. Apart from hospital dietetics, most of us here present being private practitioners, are chiefly concerned in the dieting of those patients who come from the middle and rich classes. Our knowledge of foods for the native has been so meagre, mainly for want of study, that we often unblushingly resort to the so-called patent foods, and make our patients pay a hundred-fold for articles which are indigenous and cost a trifle in this country.

Feeding in Indian fevers. So familiar have we grown with milk and sago from our student days that we are almost involuntarily led to prescribe it in all cases. The only change that suggests to us is that boiled milk should be used instead of raw milk, which, in certain hospitals, for the sake of a *paltry* economy in fuel, is issued to patients just as it comes from the milkman.

Milk is one of the best foods. It suits the European fever - patient well, being lighter than his ordinary highly nitrogenized food. With a native patient, during the first week of acute fever, milk is rather heavy for him to digest. He lives on a light farinaceous food in health; milk is to him a comparatively highly nitrogenized food. A pint of it, which we usually prescribe in fever cases a day, is equal to a couple of mutton chops in proteid value. In fevers, then, we feed our patients with an article of higher nutritive value than in health. Is it at all consistent with our scientific principles? Is it on the principle of feeding fevers? If it is, it is a bad principle to follow, at any rate in the case of our native patients.

We are taught that in the febrile state the blood becomes charged with the effete products of metabolism and the toxine of the malaria microbe or fever germ, with considerable retardation of the processes of elimination and derangements of the digestive system. There is likewise excessive waste of proteids, but its replacement must slowly follow elimination. The first indication in these fevers is elimination by purgatives, diaphoretics, and diuretics. This process is slow, even with our most active medicines. When medicinal treatment has once started this process, absorption is possible, but there is still considerable congestion or catarrh of the digestive organs which require food to be administered in a dilute and easily assimilable form. The saliva, the gastric and the intestinal juices are deficient, and the liver and other abdominal glands are more or less in a state of congestion, and these pathological changes require time for their removal and subsidence. Undue haste and irrational interference therefore retard the recuperative powers of protoplasm and produce results just contrary to our expectations.

Do we not exhibit a tendency toward this undue interference? We prescribe daily a *seer* of milk and a couple of *chittaks* of sago and ply our patients with complex fever-mixtures every two or three hours. Our fever-mixtures often contain purgatives, diuretics, and diaphoretics. With such mixtures we attempt the impossible, for it is a rare occurrence to observe all the excretory organs opened out at once at our bidding; when they do so, they indicate that protoplasmic forces have ceased to act within normal or safe limits. I have already shown that milk is a heavy food for our native fever-patients during the first week or the acute stage of fever. The watery part of the milk we give is absorbed, and there remains in the stomach and intestine a curdled mass of casein and sago, which slowly undergoes digestion or fermentative changes and serves as a favorable soil for the culture and growth of pathogenic germs. Thus, we add another source of contamination and may prolong or increase the febrile process. Indeed, I am inclined to believe that our undue interference is often the cause of driving our patients into the hands of the homœopath or the kabiraj. Let us now see whether we can replace milk and sago by more rational, more suitable and agreeable food in fever cases. *Sujee* is a substance which admits of various preparations. It is the best part of flour and is easily assimilable. A thin *gruel* of baked *sujee*, acidulated with lemons, sweetened to taste, and cooled with ice, will tempt the most obstinate among our patients. It is an excellent food for Punjabees and Hindustanees. A thin soup of baked *moong dal*, salted and flavored with lemons, is another agreeable food for this class of patients. Cooked *shyama dana* (*panicum frumentasium*) with fresh honey and rose-water will agree with the most irritable of stomachs, such as we meet among the rich *nababs* surfeited with their *pelows* and curries. The prince of fever-foods is *barley* with its *twelve* per cent. of proteids. It combines high nutritive quality with easy digestibility. It seldom disagrees or irritates. It may be given with salt or sugar and lemons, and it is admissible to all classes of patients.

How agreeable are the slightly acid rice-water, the tamarind and lemon wheys to the poor thirsty fever-patients in the hot months! There is sufficient nutriment in them, and they admit at the same time of being made the vehicles for the administration of medicines. After a saline purge, our fever-patients seldom require more than an alkali, as citrate of potash or carbonate of soda, or a little bromide of potassium to relieve pains; and these medicines can be mixed up with the food without affecting its taste to any appreciable extent.

Tamarind whey is considered almost an infallible fever-cure by our Ooryah patients. It only ranks second to rice-water in their estimation. These acidulated wheys are also liked by the Bengalee cultivators.

Khoi (fried paddy rice), *mooree* (fried rice), *panful* flour (*trapar bispinosa*), and even sago and arrowroot made into gruel, are acceptable foods to Hindu widows and the poor classes without admixture with milk. We have still to deal with the rich, highly neurotic native ladies who go into hysterical fits on the occurrence of slight fever or on the administration of a bitter medicine. I treat them generally with barley and *sherbut*, half and half. We can make *sherbuts* of lemon, orange, time-apple, pomegranate, or grapes. Medicines are to be concealed in *sherbut*, and among medicines aconite acts remarkably well in these cases.

Remittent and typhoid fevers offer us great difficulty in the adjustment of the kind, quality, and quantity of the food required for individual cases. Each case has often to be dealt with according to its requirements. No hard-and-fast rule can be applied to these cases. Neither the principle of feeding fevers nor that of starving fevers is quite applicable. The rational principle will be to adjust the food-supply in accordance with the waste taking place in the body; but since it is difficult to ascertain the exact or even the approximate wastage, our prudent course will be to begin with food in small quantity, and watch how far it agrees with our patients. Considerable discernment and experience are needed, but by caution and the exercise of patience we can generally guide our cases within lines of safety. The following rules may be laid down roughly for guidance:

(1) To give liquid food every 3 hours in measured quantity.

(2) To add to the food or give separately pure water up to 2 or 3 pints a day.

(3) To watch carefully for symptoms of indigestion, and to reduce or alter food in cases where it passes undigested through the intestines.

(4) Never to give food in a hard and solid form, as the case under our treatment may prove to be a case of typhoid fever.

I generally begin with barley with 3 or 4 grs. of common salt to a cupful; 4 oz. of it may be given every 3 hours. The intervals should not be less than 3 hours, unless in exceptional cases. In spite of great tolerance of the stomach, it needs physiological rest, which we should not disturb by more frequent feeding.

If stronger or more nourishing food is required, milk diluted with an equal bulk of barley-water or an alkalin water may be cautiously given.

Milk is, in my opinion, contraindicated when the hiccup sets in, or severe diarrhœa and tympanitis exist.

The action of milk is often uncertain. In the European it often induces constipation, but in the native it is often relaxing in its effects.

Milk boiled with a few thin dried pieces of bael corrects this tendency to looseness. A little Maltin, ½ oz. to a pint, boiled with milk, has also this effect. Milk diluted with one-third its bulk of water agrees well, when a little infusion of coffee is added to it. Peptonized milk often disagrees with native patients. Its stale and bitterish taste causes nausea. Milk and sago or arrowroot we should avoid, as these mixtures are often more indigestible than pure and diluted milk. Neither milk agrees when ordinary milk fails.

Dilute fresh broths, of chicken, pigeon, or kids, or jugged soups, mixed with barley, are excellent foods for native patients when milk disagrees.

Soups have generally a relaxing effect on the European, but I find they have just the reverse effect on the native.

Whenever there is much diarrhœa or flatulence, I substitute soups and barley or thin strained arrowroot. This, I know, is against European experience, but I am bound to record what I find to be beneficial in my own practice.

I should not, however, continue soups except for a short time, as they are merely stimulants and not nutritive. At any rate, no nutriment has been found in them by scientific inquiry.

Soups do not differ from quinol wines with regard to the extracted matter which gives rise to stimulation when taken internally. If not revolting to our feelings quinol wines would fulfil the indications for the use of soups. Indeed, they were largely used by kabirajes a few years ago for the purpose.

Only freshly-made soups or broths should be used. Stale soups or the tinned essences of meat, as Brand's and Liebig's, should be avoided. They rapidly decompose and give rise to ptomaine-poisoning in the tropics. We need not add another danger to the fever germ already working its way in the patient's system.

When the stomach is in an irritable state or hiccup is incontrollable, a mixture of *khoi mundo* (pulp of fried paddy-rice), honey, and rosewater, properly cooked, is often beneficial in small quantities. So is cocoa-nut milk.

During convalescence from fever. The treatment of fever cases during convalescence is principally dietetic, and those of us who know its details owe their success in practice almost entirely to it.

The kabiraj is *inimitable* in the cautious use of food at this stage.

With the exception of typhoid fever all other Indian fevers admit of a considerable variety of food during convalescence.

For the Anglicized Indian or Mohammedan a little soft rice with chicken, stewed in the native fashion, for the morning meal, a cup of broth with barley at midday, and a light meal of thin *sujee*, *chapatees*, or fermented loaf may be a safe beginning.

For Hindustanees, *sujee* and milk or rice and *moong dal* made into a dish known as *kichory*, with a lighter evening meal of milk and barley, may be safely recommended.

The Ooryah is always difficult to treat in the matter of food. *Chura*, or the parched and compressed rice, may be baked and served dry, or it may be reduced into a pulp and given with salt, or for the rich patients, the pulp may be mixed with sugar and milk.

Khoi, or the fried paddy, may be similarly given. These foods are also very agreeable to Bengalees.

A sudden or an early return to a rice ration in the case of Ooryahs and Bengalees is always to be avoided, as it is often seriously objected to by the relatives of the patient.

Convalescent foods for the Bengalee form a large group; and any variety of light and savory dishes are available, for a fever patient's life in Bengal would be miserable indeed on a ration of rice but for the various supplemental foods which only the Bengalee woman knows how to prepare out of a few simple vegetables. She does not spice the food so richly as the Madrassee does; and yet, with a few simple condiments, she can always produce an endless variety of dishes of remarkably delicate flavor and taste. She knows that high art in cooking, of combining bitter and pungent, sweet and sour, and of imparting a relish to food which I have never observed among other nations during my varied experience.

Cooking is a fine art in Bengal, and as long as it is cultivated and not replaced by the acquisition of foreign tastes for foods of rich coarseness, we may safely reckon upon a valuable stock of invalid foods.

Unlike the European, who seeks rice of large and coarse grains, the Bengalee prefers the fine-grained and sweet-smelling rice. For convalescents old rice is alone used. The "*atop*" or the unboiled variety should, in my opinion, replace the boiled variety. The latter is less nutritious and more liable to disagree, as I found from my experiments in the Rungpore jail. The general impression among the people is, however, unfavorable to my view, but the fact of superior health maintained by Hindu widows, pundits, and Hindustanees who live on *atop* rice confirms my observations in this respect.

The variety of old rice known as "Daudkhanee" is preferred for convalescents. It requires slow and long boiling on a gentle fire to be properly cooked.

As considerable prejudice exists against early use of rice during convalescence, "*Khoi mondo*,' previously described, should at first be prescribed, or strained stew of *moong dal*, or a stew of one of the black fishes known as *Koi Magur* or *Singhee*. These fishes have a reddish soft heart, very nutritious and easily digestible. This preliminary course may be followed by "Daudkhanee" rice, and one of the black fishes described above, stewed in the native fashion, or a light mixture of *rice and moong dal* known as *kichory*.

Various appetizers may be combined, such as *Sucktas*, made up of "pulwals," green plantains, and similar green vegetables, stewed with pulwal leaves (Pulta) or *Gandhali* (*Pœderea Fœtida*). This dish (*Suckta*) may be variously combined, and requires considerable experience for its preparation. It is slightly bitterish, but it is very agreeable to all classes of Bengalees.

Gandhali enjoys a great reputation as a cooling and appetizing adjunct.

Boiled vegetables mixed with salt and mustard oil, known as *bhurtas*, are delicious adjuncts to convalescent food. They may be made of potatoes, bringal, green plantains, etc.

Vegetables fried in mustard oil or *ghee* (clarified butter) rightly enjoy their reputation as agreeable accessories. Pulwals and pulwal leaves are used chiefly in this way.

Rice, *khoi*, or *chura* and milk, made up in the form of a light "*Payesh*" for Hindus, and "*Kirnee*" for Mohammedans, will be agreeable evening meals.

Acid stew, known as "*Ambal*," of the various preparations of *green mango*, such as *Amchur*, *Amshutta*, of *Amra*, of green *papaya*, and plantains with old tamarind are charming appetizers and adjuncts. They are much appreciated by vegetarians. These vegetable acids add to the blood their combinations with the alkalies, so necessary for vegetarians. In almost all meals there is one or more of these acid preparations in food for the healthy. These are a few of the foods procurable for convalescents from fever.

Dieting in bowel complaints. Proper regulation of food is of far greater importance in diseases of the alimentary system than in fever in India. These diseases offer a large field for practice, which is almost a monopoly of the kabiraj. The homœopath has of late successfully entered this field.

As for ourselves, regular practitioners of medicine, we are making a very tardy progress indeed, and the reason is not far to seek.

In no class of disorders is there such a wide divergence between our principles and practice. We hold that physiological rest is of the utmost importance in injuries of the stomach or the intestines, and withhold food in all such cases for 48 or 72 hours, giving sips of hot water to allay thirst, or in extreme cases of depressed small hectal enemata of half-digested food.

In acute idiopathic affections of these organs, on the other hand, we follow almost blindly the practice adopted in antiquated times, when most of these disorders were supposed to be the expression of general or constitutional ailments. In the treatment of these disorders we have not moved with the times. We begin with milk and sago, and on the appearance of slight depression wind up with soups and brandy. It is a common thing to observe a case of acute dysentery receiving his pint of milk and a cupful of sago three hours after his dose of 20 grains of ipecacuanha.

The observant kabiraj or the homœopath gives scarcely any substantial food. His medicines may be very indifferent, but his practical adoption of a great principle gives him due pre-eminence and success.

Patient watchfulness and not active interference should be our rule of practice in these cases. In acute gastric or gastro-duodenal catarrh or inflammation, our main reliance, after a mercurial or saline purgative, should be in complete abstention from food. Beyond sips of barley-water with common salt, or, much better, cocoanut milk, food should be interdicted for two or even three days. This is generally enough for a cure. If there are pains, hot fomentation would be much preferable to strong doses of opium. But I need not go over the treatment of the disease.

In cases of acute diarrhœa the same principle of rigid abstention from food is necessary, but here greater watchfulness is required, for undue depression is to be avoided. Lemon whey or sulphuric whey is the best form of food in profuse fluxes, and in the inflammatory forms attended with the discharge of much mucus, *whey* with alkalies, specially magnesia and bismuth, is invaluable. Medical treatment is called for from the beginning, but it should be different from the active use of astringents, and large doses of opium, small doses of castor-oil, perchloride of mercury, salol, belladonna, camphor, and opium are required, both for purposes of evacuating the bowels and of disinfecting the mucous surface.

In cholera the administration of irritating stimulants and drinks has, in my opinion, justly brought our system into opprobrium with the people of our country. The regular practitioners are *shunned* by them, and the homœopath flourishes in this field of practice where we should have secured a firm hold.

By the frequent administration of his drops of thousand dilutions the homœopath does not disturb the physiological rest of the intestines. His harmless intervention is the cause of his success, and teaches us a lesson of non-interference in this formidable disease.

Small doses of calomel and drop-doses of a saturated solution of camphor in chloroform, which I found gave the best results in the great epidemic of cholera at Contai, in the Midnapore District, in 1874, have been found to yield similar results in the last cholera epidemic at Hamburg. Treatment based on such a *rationale* will likely succeed. Sips of iced water or coffee, and not pints of fluid recklessly poured into the stomach, can be borne during collapse.

If the blood wants saline water it can be supplied only in one way, viz., by hypodermic injection of saline water and not by filling the intestines with iced water, which does not undergo absorption from its mucous surface.

When reaction sets in in cholera nothing is so agreeable and beneficial to the patient as freshly prepared lemon whey, given in small quantities and mixed with a few grains of citrate of caffein; the latter to stimulate the heart and promote diuresis by relieving congestion of the kidneys. Whey contains sufficient nutriment and *lactose* to be useful at this stage of the disease. To ply the patient with frequent draughts of brandied broth or milk is pure quackery, and is against the dictates of physiological science.

There is no disease where abstention from food is so salutary in its effects as in the first stage of acute dysentery.

Nothing but barley-water should be given in small quantities with common salt and a few drops of Ptychotes water to relieve thirst during the first 48 or 72 hours. Milk and soups are to be avoided.

Ipecacuanha is our only remedy in this disease; as far as hospital patients, soldiers, or prisoners are concerned, or where compulsion can be used, the medicine in large doses is singularly successful. Mix as we may, either with opium or chloral hydrate, ipecacuanha generally produces persistent nausea and often vomiting. This is a great drawback to its employment in private patients. The active principle of ipecacuanha is still uncertain, but recent pharmacological experiments indicate that emetin is its medicinal principle, and tabloids containing emetin in small doses deserve a trial among our native patients.

The success attending other kinds of treatment shows that the disease may be treated in several ways. A brisk purge, *percubials* or salines, or a hydragogue vegetable purge followed by small doses of castor-oil emulsion with opium or hemp and perchloride of mercury, gives as good results as ipecacuanha in the subacute forms in which the disease often appears in natives. But the first condition for success is total abstention from food.

The most intractable diseases we have to treat in India are the chronic forms of dyspepsia and bowel complaints. Judicious dieting is here of paramount importance. The glandular and motor functions of the stomach and the intestines are seriously impaired and the power of digestion becomes greatly deteriorated. We cannot by heroic feeding and drinking counteract the great emaciation and prostration which are the inevitable consequences of impaired digestion.

The administration of strong soups and alcoholic stimulants, which we often adopt in these cases, simply irritates the already impaired digestion and accelerates death by inanition. This, I think, is the main cause of our failure in the treatment of these cases. The kabiraj scores the highest success by careful feeding. His method is to cautiously feed the patient with an unstimulating and a fairly nutritious food. One great dietetic principle he teaches us is the administration of food in a state of pulp or in a pure solid state, and not in a liquid form, and the restriction of water or liquid of any sort during the meals. Beyond the empirical knowledge that such foods do good, the kabiraj cannot give satisfactory reasons for his method. But a slight physiological consideration will indicate to us that his method is a practical illustration of a scientific principle. Food in a pulpy state and in a state of minute division calls forth both the glandular and motor functions of the stomach and intestines, and does not dilute the already weakened digestive secretions. Its state of fine division renders it also easily assimilable.

And now a few words as to their management.

In chronic gastritis or a dyspepsia with fetid eructations and flatulence appearing a couple of hours after a meal and showing deficient secretion of gastric juice, the indications for treatment are well known to all of us, viz., the clearance of the excessive mucus from the stomach, and the reduction of food both in quantity and quality to suit the digestive capacity of our patients.

The first indication is met by a dose of Carlsbad or a mild saline aperient, and the second by administering measured quantities of food, such as old rice pulp strained, about 4 oz., with half its quantity of *moong dal* pulp flavored by lemon-juice and partially digested by a few drops of *papaya* juice. When we find this food disagree, we may further attenuate it without diminishing its nutritive aliments. Pulp of rice or *khoi* mixed with *dahi* or *buttermilk* is an ideal food for this disorder.

In another class of dyspepsia where excessive acidity is due to fermentative changes or excessive secretion of gastric juice, the addition of one of the black fishes previously mentioned, or the flesh of goat, well stewed with old rice, for the midday meal, and the administration of lighter foods at intervals of four hours, will relieve the symptoms. No liquids should be drunk during the meals, but some cocoanut milk should be given an hour or so after the midday meal. Here the indications are to neutralize its abnormal acid secretions of the stomach, and these are met by frequent administration of food specially rich in proteid aliment.

Chronic diarrhœa and dysentery afford greater chances of recovery by *dietetic* than by *medicinal* means.

Careful observation is necessary to find out the digestive capacity of patients by beginning food in small quantity or by following the method already stated under dyspepsia. Milk with farinaceous food is badly borne by these patients. Pure milk mixed with one-fourth of its bulk of lime-water or fluid magnesia given in small quantities sometimes agrees; but, as a rule, cow's milk is too rich for the impaired digestive power of our patients. Goat's milk, fresh and undiluted, often agrees in small quantities, but as their milk has a tendency to form large clots, it will be advisable to mix it with one-fourth its bulk of boiled *shamadama*.

In the majority of these cases milk does not agree, and it will be necessary to try other combinations of food.

Old rice pulp with one of the black fishes with *dahi*, or a mango preparation as *Amchur* or *Amsutto* as an adjunct, will be found very useful. Where rice disagrees, fried *chura* or *khoi* pulp with *dahi* may be tried. The cooked pulp of green plantains mixed with *dahi* succeeds where other forms of food fail. A little green *papaya* cooked with *Amada* (*Curcuma amada*) and old tamarind is a serviceable adjunct. Food should not be given more than two or three times a day. When a third meal is given it should consist of a little barley or arrowroot. Betel-nut should be prohibited, as the pieces of woody matter may irritate the ulcerated mucous membrane. Where the patient cannot be prevented from his habitual *pan*, the betel-nut should be ground to a powder and given with the usual ingredients of *pan*. *Pan* is a digestive stimulant, antacid and astringent, and is therefore admirably suited as an adjunct after vegetable meals. The pepper leaf is a carminative and dialagogue, lime is antacid, and catechu is astringent, and betel-nut is not only a vermifuge, but from its containing the alkaloid *anecaline* it acts as a stimulant to the nervous system.

Potatoes and cereals (*dals*) disagree in these chronic bowel complaints. Green plantains, country figs (*Colocasia Indica*), pulwals, and bringals are valuable in these diseases.

In diseases of the kidney, *milk* is almost a cure, and we have already borrowed this milk treatment from the kabiraj without acknowledging our debt.

I fear I have already tired you with an imperfect sketch of the subject of my address and must therefore stop. I only wish the claims of the poor native *mati* will not escape your attention in these days of revolutionary changes in medicine.

Dr. Simpson said that the above subject is very much neglected everywhere. There is only one journal in America which is devoted to this subject, viz., THE DIETETIC AND HYGIENIC GAZETTE. He thought that practical dietetics should form a part of the curriculum of studies of the medical student. The most successful physicians were those who paid particular attention to diets. A want of knowledge of the proper diet did a good deal of harm.

Dr. B. C. Sen said that the injudicious administration of food does greater harm than starvation. He hoped that there should be investigators on this subject.

Dr. Pilgrim thought that the kabirajes and hakims go much the other way, viz., they starve the patient. The high mortality of children was, according to him, due to starvation.

Dr. Maynard said that he made some experiments with *papain*, and found that it had great digestive powers on proteids. He wanted to know in which diseases it is efficacious.

Dr. Crombie wanted to know why natives of Bengal object so much to the use of rice in fever.

Dr. D. D. Roy said that rice is quite innocent in fevers, and the objection is groundless, and people blindly follow long-established custom.

Dr. Dutt briefly replied.—*Indian Med. Gazette.*

PUBLIC HEALTH AND THE UNITED STATES GOVERNMENT.

The Committee of the American Medical Association, appointed to get up a Department of Public Health, with a secretary who shall be a member of the Cabinet, has issued another circular to the members of the American Medical Association. Ignoring entirely the fact that there is now before Congress a bill which will help enormously toward the end which they themselves desire, it proceeds to say that its own bill is not yet strong enough to pass Congress. It then recommends that all State medical societies and all local societies pass resolutions favoring the doctrine in the bill, and that every doctor in the United States (one hundred thousand in all) shall address a private letter, in advocacy of said bill, to the Senators and Representatives in Congress. The circular is signed by Dr. Jerome Cochran, of Montgomery, Ala., chairman, and the seven other members of the committee. We are greatly in favor of securing some such plan as the committee wishes, but nothing is more certain than that such a bill cannot be passed for many years. Therefore, instead of wasting time in empty declarations, it seems to us it would be wiser if the committee would take hold and try and get what is practicable. One of the means to this end would be a conference between the committees of the American Medical Association and the New York Academy of Medicine, with an agreement on a joint bill.—*N. Y. Med. Rec.*

THE MEDICAL VIEW OF WATER THREE CENTURIES AGO.

It needed a very bold man, says *The Hospital*, to resist the medical testimony of three centuries ago against water-drinking. Few writers can be found to say a good word for it. One or two only are concerned to maintain that, "when begun in early life, it may be pretty freely drunk with impunity," and they quote the curious instance given by Sir Thomas Elyot in his "Castle of Health," 1541, of the Cornish men, "many of the poorer sort, which never, or very seldom, drink any other drink, be notwithstanding strong of body, and like and live well until they be of great age." Thomas Cogan, the medical school-master of Manchester fame, confessed in his "Haven of Health," 1589, designed for the use of students, that he knew some who drink cold water at night or fasting in the morning without hurt; and Dr. James Hart, writing about fifty years later, could even claim among his acquaintance "some honorable and worshipful ladies who drink little other drink, and yet enjoy more perfect health than most of them that drink of the strongest." The phenomenon was undeniable, but the natural inference was none the less to be resisted. Sir Thomas Elyot himself is very certain, in spite of the Cornish men, that "there be in water causes of divers diseases, as of swelling of the spleen and liver." He complains oddly also that "it flitteth and swimmeth," and concludes that "to young men, and them that be of hot complexion, it doeth less harm, and sometimes it profiteth, but to them that are feeble, old, and melancholy, it is not convenient." "Water is not wholesome cool by itself for an Englishman" was the verdict of Andrew Borde—monk, physician, bishop, ambassador, and writer on sanitation—as the result of a life's experience. And to quote again the "Englishman's Doctor,"

"Both water and small beer, we make no question,
Are enemies to health and good digestion."

But the most formal indictment against water is that of Venner, who, in writing in 1622, ponderously pronounces "to dwellers in cold countries it doth very greatly deject their appetites, destroy the natural heat, and overthrow the strength of the stomach, and consequently confounding the concoction, is the cause of crudities, fluctuations, and windiness in the body."—*Med. Rec.*

Department of Physiological Chemistry.

WITH SPECIAL REFERENCE TO DIETETICS AND NUTRITION IN GENERAL.

Edited by R. H. CHITTENDEN, PH.D.,

Professor of Physiological Chemistry in Yale University.

THE ABSORBABILITY OF IRON SALTS.

IT has long been held by many investigators, notably by Kobert and Bunge, that iron salts as such are not capable of absorption from the alimentary canal, and that the organism must therefore derive its supply of ferruginous material, out of which it manufactures hæmoglobin, from complex organic compounds in which the iron is held in close chemical union. In harmony with this view Hamburger has found that simple iron salts taken by way of the mouth do not lead to any increased elimination of iron through the urine, but this fact can hardly be taken as proof of the non-absorption of the iron. Similarly, the fact that there is no increased elimination of iron through the bile when iron salts are ingested hardly constitutes proof of the non-absorption of the metal, as many writers are inclined to believe. It is indeed quite possible, as Gottlieb has urged, that iron salts may be absorbed from the alimentary canal into the blood and then later be excreted through the intestine. Thus Gottlieb has reported one experiment where 100 milligrams of iron were injected subcutaneously and intravenously during a period of 20 days, in which 96.9 milligrams of the iron ultimately appeared in the fæces. When iron salts are thrown into the blood they certainly do not remain there long, as Jacoby has shown, two to three hours being sufficient for their complete removal. In such cases, a portion at least of the iron appears to collect in the liver, where it remains for a time, and then may find its way into the intestine.

Quite possibly, as Kunkel has suggested, iron salts combine in the intestine, or in the walls of the intestine, with albuminous matter, thus forming an insoluble albuminate, and storage of iron in the liver may likewise be associated with the formation of some complex iron compound; a view which is certainly quite plausible and fully in harmony with the well-known affinity of iron for albuminous matter. If rabbits are fed with iron salts and then killed by bleeding the kidneys fail to show any stronger reaction for iron than the kidneys of normal rabbits. The livers of the animals, however, give a much stronger iron reaction than the livers of normal rabbits, thus indicating an accumulation of iron in the hepatic cells. This being so, the question naturally arises as to the way in which the iron exists in the liver. Woltering,* who has made a recent study of this question, finds that if the liver of a normal rabbit be extracted first with chloroform water, and then with a one per cent. solution of sodium chloride, a proteid body is dissolved precipitable by dilute acetic acid, and yielding on digestion with artificial gastric juice an insoluble nuclein. The body in question appears to be a nucleoproteid containing iron, and the proportion of iron in the nucleoproteid is apparently increased by the feeding of iron salts. Further, it is possible not only to separate a ferruginous nucleoproteid from the liver, but also ferratin, and doubtless other iron-containing bodies exist in this organ, representing a class of complex organic compounds holding combined iron. According to Woltering, the amount of so-combined iron is unquestionably increased by the ingestion of iron salts with the food. Iron salts taken by way of the mouth are directly absorbed and the iron tends to accumulate in the liver, the latter having both an absolute and relatively higher content of iron than the livers of normal animals. The nucleoproteid spoken of above is to be considered simply as a type of complex compounds in which the iron is held, masked as it were, so that its presence cannot be detected except by some method which involves the destruction of the compound. The following results presented by Woltering may be taken as an illustration of the effect of feeding iron salts upon the content of iron in the liver:

---

* *Zeitschr. f. physiol. Chem.*, Band 21, p. 202.

Content of Iron in the Liver (Percentage of dried substance).

Kind of animal.	Fed with ordinary food.	Fed with ferrous sulphate.
Mice.........	0.205 per ct.	0.430 per cent.
Rabbits.......	0.095 "	0.155 "
"	0.087 "	0.220 "
"	0.117 "	0.180 "
"	0.120 "	0.320 "
Dogs.........	0.036 "	0.106 "

The practical question which these results suggest is naturally whether the iron so stored up in the liver can be utilized by the body when the latter has need to form more hæmoglobin. Obviously, if iron salts have practical utility as therapeutic agents in an anæmic condition of the body, the iron must be in a condition fit for immediate utilization in the construction of hæmoglobin. Woltering has attempted to answer this question by numerous experiments on animals, one or two of which may be referred to.

Rabbits fed upon an ordinary diet were examined from day to day with a view to determining the average content of hæmoglobin in the blood and the number of blood corpuscles per cubic millimetre, after which a definite amount of blood was withdrawn from the body and the above examinations continued. Parallel experiments were also made with rabbits fed on the same diet, but with an addition of 250 milligrams of ferrous sulphate every second day, and the results compared with those obtained with the normal animals.

Normal Rabbit.

Body weight 2.82 kilos.

Date.	Content of hæmoglobin (average).	Number of blood corpuscles in 1 c.mm.
12 January....	$72\frac{3}{5}$	5,850,000 average.
14 "	$73\frac{2}{5}$	5,950,000 "
15 " ...	$73\frac{3}{5}$	5,970,000 "
15 "	30 c.c. blood withdrawn from the carotid artery.	
16 " ...	$53\frac{3}{5}$	3,770,000 "
18 "	$53\frac{1}{5}$	4,150,000 "
20 "	$56\frac{4}{5}$	4,700,000 "
22 "	$56\frac{3}{5}$	5,000,000 "
24 "	$60\frac{1}{5}$	4,850,000 "
24 "	25 c.c. blood withdrawn from the jugular vein.	"
26 "	$46\frac{3}{5}$	4,230,000 "
28 "	50	4,200,000 "
30 "	54	4,700,000 "
2 Feb'y......	$58\frac{3}{5}$	4,500,000 "

Rabbit fed with Ferrous Sulphate.

Body weight 1.43 kilos.

Date.	Content of hæmoglobin (average).	Number of blood corpuscles in 1 c.mm.
18 August....	$59\frac{2}{5}$	4,750,000 average.
20 "	59	4,800,000 "
21 "	$58\frac{2}{5}$	4,100,000 "
21 "	30 c.c. blood withdrawn from the carotid artery.	"
After 1 hour..	$42\frac{2}{5}$	2,800,000 "
22 August....	$39\frac{1}{5}$	2,710,000 "
23 "	$40\frac{3}{5}$	2,330,000 "
25 "	$41\frac{4}{5}$	3,400,000 "
27 "	$48\frac{3}{5}$	3,600,000 "
29 "	$51\frac{4}{5}$	3,720,000 "
31 "	$53\frac{3}{5}$	3,670,000 "
1 September..	52	4,110,000 "
3 "	$54\frac{4}{5}$	4,160,000 "
6 "	57	4,810,000 "

It is thus plain that while in a normal rabbit the reduction of both hæmoglobin and red blood corpuscles which accompanies the withdrawal of blood from the body is fairly stationary, in a rabbit fed with ferrous sulphate the diminution of both hæmoglobin and corpuscles is soon made good, thus indicating the utilization of the iron salt by the system.

The iron taken in by the mouth is apparently absorbed from the intestinal canal, forming in its passage compounds with albuminous matter which are carried to the liver and there deposited. In this organ the iron compounds are, perhaps, again worked over, being remodelled to serve in the production of hæmoglobin. Hepatin, ferratin, the nucleo-proteid above referred to, and probably other ferruginous compounds also are types of the combinations existing in the liver. The latter organ thus holds the iron needed by the system for its daily wants, and any surplus of the metal over and above what is required by the body is excreted through the intestine.

NOTES FROM GERMANY.

BY LAFAYETTE B. MENDEL, PH.D.,
BRESLAU.

THE intimate relationship which the bodies of the xanthin group bear chemically to one another and to uric acid has frequently been discussed in this department of the GAZETTE. In a previous note[*] the transformation of dimethyl-uric acid into theophyllin (dimethyl-xanthin) by Emil Fischer and Ach has been reported and the importance of this reaction emphasized. Ever since Kossel and his co-workers demonstrated that the xanthin bodies are products of the decomposition of cell nuclei investigators have attempted to trace the origin of uric acid in the organism to these products. In the case of birds the transformation of hypoxanthin into uric acid has been proved; but in these animals uric acid is the normal end product of metabolism, and has a significance quite different from that in the case of mammals. For the latter the experiments of a number of investigators has led to no definite or positive results, although Horbaczewski obtained uric acid from the cells of spleen pulp outside of the body. In fact much evidence has pointed to the decomposition of the xanthin bodies when introduced into the body, into much less complex substances, perhaps antecedents of urea. The fate of the xanthin derivatives—coffein (trimethyl-xanthin) and theobromin (dimethyl-xanthin)—in the organism has been the subject of recent investigations in Professor v. Schröeder's laboratory in Heidelberg.[*] Rost found that as much as 21. per cent. of the coffein introduced can reappear unchanged in the urine: for the rabbit, the maximum thus recovered was 21.3 per cent.; for the dog, 8 per cent.; for the cat, 2.4 per cent.; and for man only traces. Theobromin was excreted unchanged to the extent of 31.8 per cent. as maximum, 20.7 per cent. being the highest figures obtained in the case of man; its absence from the fæces indicates that it was completely absorbed when introduced *per os*. The fact that the extent of the excretion of coffein and theobromin was found to proceed parallel with their diuretic action suggests a causal relation between the two phenomena; according to v. Schroeder[†] the diuretic action of the substances named is due to their direct influence on the renal epithelium, rather than to increased blood pressure.

Since it is evident from the facts presented above that both coffein and theobromin are to a considerable extent transformed after introduction into the body, Bondzynski and Gottlieb investigated the metabolic products of these substances. They were able to isolate from the urine of the rabbit and dog a substance which proved to be methylxanthin. The quantity of this substance excreted formed no inconsiderable portion of the xanthin derivative ingested. In one case, after feeding 1.5 grams of theobromin (dimethyl-xanthin) there reappeared in the urine of the following 48 hours 19 per cent. unchanged theobromin and 24.6 per cent. in the form of methylxanthin. Xanthin was not found. This cleavage of a methyl (CH_3) group from xanthin derivatives is most interesting in comparison with the transformation of tellurium and selenium salts to methyltelluride and methylselenide, as observed by Hofmeister, and the observations of His regarding the transformation of pyridin to methylpyridin. Methylated xanthin bodies have been previously found in the urine by Thudicum and by Salomon. The methylxanthin found by Bondzynski and Gottlieb probably corresponds with the "heteroxanthin" of the latter investigator.

---

[*] GAZETTE, January number, 1896.

[*] St. Bondzynski u. R. Gottlieb: Ueber Methylxanthin, ein Stoffwechselprodukt des Theobromin und Coffein. *Archiv für exper. Pathol. u. Pharmakol.*, 26. Eugen Rost: Ueber die Auscheidung des Coffein und Theobromin im Harn. *Ibid.*, 26.

[†] *Ibid.*, 22, 24.

It has long been known that the excretion of xanthin bases in the urine is increased in leukæmia, a disease in which the number of colorless blood corpuscles is greatly increased. Bondzynski and Gottlieb* have investigated a somewhat unusual case of leukæmia in which the xanthin bases were excreted to three or four times the normal extent. Since xanthin bodies—for example, theobromin—introduced *per os* were decomposed to the same extent as in the normal individual, the conclusion is reasonable that in leukæmia the xanthin bases having their origin in the decomposition of nuclei, especially the nuclei of the more numerous leucocytes, behave in the organism quite differently from the xanthin bases absorbed from the alimentary tract. While the latter are decomposed in the normal manner, the nuclei-products are excreted as such. Moreover, in the case investigated the results seem to indicate that xanthin bases take the place of uric acid, in part, and are preliminary steps in the formation of the latter in leukæmia. If, as Nencki and Sieber assume, uric acid is normally a product of the oxidation of xanthin bases in the body, it may be that we have in leukæmia an instance of decreased oxidative changes in certain tissues, and that the xanthin bases are therefore partly excreted in an unoxidized form, *i.e.*, as such. As evidence of the possibility of this explanation, Bondzynski and Gottlieb point to the unusual quantities of volatile fatty acids in the urine of their patient. Instead of the traces (0.008 gram per diem) normally present they found as much as 0.136 gram. Since other investigators have failed to find a decrease in the total oxidation, *i.e.*, oxygen consumption of the body in leukæmia, it may be that we have merely a disturbance of the normal oxidative changes taking place in those cells in which the transformation of xanthin bases into uric acid occurs. Horbaczewski's theory would suggest the leucocytes. Accordingly, increased excretion of uric acid in leukæmia would be the indication of increase in the number of leucocytes; increased excretion of xanthin bases would be explained by the disordered metabolism of the leucocytes. Such hypotheses are most interesting at present, even though they lack complete experimental confirmation.

OBSERVATIONS ON THE CAUSES AND TREATMENT OF CHLOROSIS.

By Ralph Stockman, M.D., F.R.C.P.E.

Many causes of chlorosis are enumerated by authors, chief among them being absence of light and fresh air, overwork, especially under unfavorable conditions, heated rooms, insufficient exercise, depressing emotions and unhealthy excitement, indigestion, constipation, insufficient food, and excessive or otherwise faulty menstruation, besides others which need not be here particularized. Most of these are probably predisposing rather than direct causes, and I hope to show in this paper that there are two great and direct causative factors in chlorosis, namely, blood-loss and an insufficient supply of iron by the food. If this be correct, then excessive menstruation or other blood-loss and insufficient supply of food from any cause are the only two factors among those just mentioned which directly bring on the anæmia, the others doing so only in so far as they contribute to produce these two.

Virchow's view that chlorosis is dependent on congenital hypoplasia of the arterial system is apparently contradicted by the fact that it is a condition which lasts at most for a few years, and often only for some weeks or months, being completely and permanently recovered from, and hence the causes which produce it must also be transient and avoidable. It is possible, however, that such individuals may be congenitally deficient in blood-forming power, and thus readily tend to become anæmic when any strain is thrown on the blood.

---

* Ueber Xanthinkörper im Harn des Leukämikers. *Archiv für exper. Pathol. u. Pharmakol.*, Bd. 26.

The theory supported by the late Sir Andrew Clark[*] and others, that chlorosis results from constipation, with consequent absorption of ptomaines which break down the red blood corpuscles, is in no way supported by facts, but rather the contrary. Many cases of chlorosis do not suffer from constipation, and further, it has now been proved by trustworthy investigations that there is neither excessive formation of decomposition products in the intestinal canal, nor any excessive breaking down of the red blood corpuscles. As a matter of fact, fewer corpuscles break down in chlorosis than under normal conditions. The very pale color of the urine, and frequently also of the fæces,[†] indicates that less coloring matter than usual is being furnished by the hæmoglobin, and hence that fewer red corpuscles are breaking down. When excessive decomposition is going on in the contents of the intestine, the products of this (compounds of skatol, phenol, etc.) become more abundant than usual in the urine, but Rethers[‡] and Mörner[§] have found that in chlorosis these products are generally diminished in amount, thus conclusively proving that there is no excessive sepsis in the alimentary canal. These researches help further to disprove the truth of Hannon's and Bunge's theory, which also rests on the assumption of increased intestinal decomposition, whereby the sulphuretted hydrogen and ammonium sulphide suggested to be formed are said to separate the iron out of the food, and thus prevent its absorption. I have already shown,[‖] however, that both Sir Andrew Clark's and Bunge's theories are untenable on other grounds.

It may now be held as proved, therefore, that in chlorosis there is no excessive breaking down of red corpuscles, and hence the anæmia must result either from deficient formation or excessive loss of blood. What elements in the blood are especially affected? The blood-serum seems to be very little, or not at all deteriorated, for L. Beale[*] found the specific gravity and solids to be practically the same in a girl before treatment and after recovery, while Quinquand[†] found the solids to be 88 to 94 per 1000 in chlorosis and 92 to 94 in health, the several constituents being practically unaltered. On the other hand, the hæmoglobin is always deficient, and the number of red blood corpuscles is usually, but not invariably, so. In 63 cases of chlorosis which I have treated in hospital,[‡] the lowest estimate of hæmoglobin (on Gower's hæmoglobinometer) was 20 per cent., the highest 66 per cent., while only 6 of these cases had over 4½ million corpuscles per cubic millimetre, the others having from 4½ down to slightly under 2 millions. Not only are the corpuscles deficient always in hæmoglobin and usually in number, but often many of them are ill-formed and small. The hæmoglobin, however, is invariably deficient, whether the corpuscles be so or not, and the severity of the clinical symptoms depends chiefly on the extent of this diminution in hæmoglobin. Quinquand found that in healthy women 100 c.cm. blood yielded 21 to 24 c.cm. oxygen, while in chlorotics the same amount of blood gave only 10 to 15 c.cm. It is the deficiency of hæmoglobin combined with the consequent deficiency of oxygen which gives rise to the pallor, debility, breathlessness, and impairment of functions generally which all go to form the clinical picture of chlorosis.

In discussing the etiology of chlorotic anæmia, as it is found in young girls at or not very long past the age of puberty, the chief points which attract attention are the sex, age, the condition of the digestive organs, the conditions of the menstrual functions, and the frequent tendency to relapse. I shall consider these in the order named.

---

[*] *Lancet*, 1887, 2, 1003.

[†] Von Noorden, *Berlin klin. Wochenschr.*, 1895.

[‡] Dissertation, Berlin, 1891.

[§] *Zeitschr. f. physiol. chem.*, 18, 1893.

[‖] *British Med. Journal*, 1893, 1.

[*] *Med. Times*, 1851, 1, 618.

[†] *Chimie Pathologique*, 1880.

[‡] *Edin. Med. Journal*, November, 1895.

Sex.—Chlorosis is infinitely most frequent in very young women, and this suggests the question as to what influence sex exercises on the composition of the blood. Women generally in health have about 10 per cent. fewer corpuscles than men, 8 to 10 per cent. less hæmoglobin, and 4 to 5 per cent. more water in the blood. Their blood is, therefore, less able to withstand any drain on it, and, as will be more particularly noticed immediately it is well recognized that at puberty and for some time after there is a greater drain than takes places in lads at the same age.

Age.—Leichtenstern * found that from 18 to 25 the hæmoglobin is about 8 per cent. less than from 25 to 45 years of age, and Sörensen that from 15 to 28 in healthy women the number of corpuscles is less than at other ages, which he attributes to menstruation. Further, girls develop with extreme rapidity from 15 to 18, throwing a great strain on the organism, which suffers in various ways besides in blood-forming. Out of my 63 cases of chlorosis previously cited, no fewer than 41 were between the ages of 15 and 20, and the highest age at which a first attack occurred was 23. Owing to the strain of rapid growth at this age all the various functions of the body suffer, and not only is blood formation deficient in itself, but digestion is impaired and appetite poor, so that an inadequate amount of food, and consequently of iron, is consumed. The onset of menstruation at a time when mere growth is making such demands on the organism still further drains it of blood and of iron and tends to the production of anæmia.

The condition of the digestive organs.—In growing girls and in chlorosis gastric digestion is very frequently impaired, and constipation is common, showing that the whole process of primary digestion is very ill-performed. Out of my 63 cases, 32 suffered from constipation, while 38 had marked dyspepsia, and in many cases where gastric dyspepsia was not complained of, it was found that the patient had learned by experience to be extremely careful in her diet. The dyspepsia and constipation lead to the consumption of a totally inadequate amount of food, and therefore of a totally inadequate amount of iron. I have recently analyzed * fifteen dietaries of healthy persons, taking in each case an exact duplicate of the cooked food and liquids consumed during one day, and it was found that, for persons with moderate appetite and not working very hard, the total amount of iron ingested was from a little over 6 to 8 milligrams ($\frac{1}{11}$ to $\frac{1}{8}$ grain) per diem, while persons with large appetite ingested from 8 to 11 milligrams of iron ($\frac{1}{8}$ to $\frac{1}{6}$ grain). Four analyses * of the daily dietary of two girls suffering from chlorosis gave only 2.8, 3, 3.2, and 1.3 milligrams iron (about $\frac{1}{60}$ to $\frac{1}{20}$ grain), while the dietary of a third chlorotic girl, who had lived for three months on a small quantity of bread and milk daily, gave only 1.2 milligrams of iron per diem. It is difficult to reckon accurately the total daily excretion of iron from the body, and no doubt it varies within certain physiological limits, but it is probably somewhere about 6 milligrams on an average. It is evident, however, that persons habitually ingesting a quantity of iron so much less than is excreted in health will gradually acquire a deficiency of hæmoglobin in their blood, owing to the new corpuscles which are constantly being formed not finding enough iron in the organism to furnish them with a sufficient supply of hæmoglobin.

An experiment which I made upon a dog illustrates this.† The animal, a collie, in its ordinary dietary consumed about 10 milligrams of iron per day, its red corpuscles equalling 6 millions per c.mm., and its hæmoglobin 90 per cent. It was then put on a dietary which maintained its weight, but from which the iron had been as far as possible extracted, so that it got only 2 to 3 milligrams per day. In forty-six days the hæmoglobin had fallen to 64 per cent., although the corpuscles had slightly increased. When put back on its old diet the hæmoglobin very gradually rose again, while the corpuscles also increased in number very considerably. There was no lack of power to form hæmocytes, but simply a deficiency in them of hæmoglobin, resulting from long-continued deficiency of iron in the food. Many cases of chlorosis present a similar condition.

---

* Untersuchungen über den Hæmoglobingehalt des Blutes, 1878.

* *Journal of Physiology*, vol. 18, 1895. (See the last number of the GAZETTE.)

† *Journal of Pathology*, 3, 1895.

The observation has frequently been made that during starvation the corpuscles and hæmoglobin both rise, often very considerably, in a given bulk of blood, but this is due simply to less fluid being taken, and the blood becoming thereby more concentrated. The same increase has been observed in cases of phthisis and of diarrhœa where fluid is drained off by sweating or by the watery aloine discharges. The increase is only apparent, and there is abundant evidence to show that during partial or complete starvation both corpuscles and hæmoglobin are reduced. Reinert[*] states that during inanition the corpuscles fall from the beginning if fluids be given, and Vierordt during the hibernation of a squirrel observed its red corpuscles fall from 7,748,000 per c.mm. to 2,355,000. Quinquand found a very large fall of hæmoglobin in lunatics who refused food, and Piorry relates the case of a man who committed suicide by eating less and less each day, dying ultimately after two months, during which time he developed all the symptoms of anæmia.

Quality, as well as quantity, of food is of importance as regards the supply of iron. Verdeil[†] found that a dog fed for 18 days on flesh had 12.75 per cent. of iron in its blood ash, while one fed on bread for 20 days had only 8.65 per cent., and Subbotin[‡] confirms this on different species of animals, as regards the amount of hæmoglobin.

My own analyses of iron[‖] in different articles of food showed that they contained very different amounts. Thus, in two analyses of bread, one pound (undried) yielded 1.7 and 2.7 mg. (1.38 and 1.24 grain), one pint of milk 2.2 mg. (about 1.30 grain), and one pound of beefsteak 18 mg. (about 2.7 grain) iron. There can be no doubt, therefore, that the quantity and kind of food consumed exercises an important influence on the amount of iron available for blood-formation.

Menstruation or other blood-loss. — The onset of menstruation while the body is actively growing makes a great demand on the blood. Gowers[*] found that during a menstrual period in a chlorotic girl the corpuscles fell as much as 10 to 20 per cent. of their total number, and in one case during five days I found that they fell from 4,320,000 to 3,764,000 per c.mm. Hunt[†] and Wilcox[‡] also observed a diminution. The loss is easily borne by the vigorous and fully grown woman, who finds no difficulty in regenerating the corpuscles and hæmoglobin, hence the rarity of chlorosis after the age of twenty-five. In chlorotics, however, the corpuscle-forming power is often lessened temporarily, but this seems to be due largely to lack of iron, and possibly also to general impairment of nutritional activity, for as soon as iron is given and the patient put under favorable hygienic conditions new corpuscles are formed with great rapidity. Further, the healthy woman has sufficient reserve of iron at once available for use stored in the liver and spleen, but in girls ill-nourished from any cause, or who have been drained of this iron by hæmorrhage, there is little or no iron in the body to draw on for the manufacture of red corpuscles, and thus they become anæmic.

A fatal case of gastric ulcer which I had in a girl, aged 18, illustrates how completely the body may be deprived of its iron by hæmorrhage. During three days she had hæmatemesis to the extent of about 50 ounces, and then several smaller bleedings previous to death. The liver contained only 0.018 g. iron per 100 parts dried, and the spleen 0.041 g. calculated for 100 parts dried. It may give a better idea of the extreme poverty of these organs in iron when it is stated that the whole spleen only contained 5 mg. ($\frac{1}{12}$ gr.) of iron, and the whole liver 4 c.gm. ($\frac{2}{3}$ gr.), amounts which are probably fully accounted for by the blood, which was unavoidably left in the organs. The iron usually stored in the liver and spleen cells had disappeared.

---

[*] *Die Zählung der Blutkörperchen*, 1891.

[†] *Annales de chim. et de Pharm.*, 69, 1849.

[‡] *Zeitschr. f. Biol.*, 7, 185, 1871.

[‖] *Journal of Physiology*, loc. cit.

[*] *Lancet*, 1, 673, 1878.

[†] *Lancet*, 2, 87, 1880.

[‡] *Practitioner*, 1, 31, 1883.

An experiment made on a dog proved the same thing. The animal, a large collie, at the beginning of the experiment had 8,000,000 corpuscles per c.mm. and 108 per cent. hæmoglobin, and during three weeks it was bled to the extent of 687 c.cm., when the corpuscles had fallen to 5,280,000 and the hæmoglobin to 48 per cent. In twenty-eight days afterward the corpuscles had risen to their original number and continued to increase, but the hæmoglobin required ninety-seven days to reach 104 per cent. It was then killed, and only a mere trace of iron was found in the liver. During this time it had received no chalybeate treatment, and its food contained about 8 to 10 mg. iron daily.

It is certain, therefore, that loss of blood not only directly produces anæmia, but prevents speedy recovery from it by drawing off the reserves of iron in the body.

Most cases of chlorosis, when fully developed, have amenorrhœa, which must be regarded as beneficial and protecting against further loss of blood. In many cases the loss of blood by menstruation has never been actually large, but only relatively so, when compared with what the organism is able to withstand at a time when a very heavy strain is being put upon it otherwise. Many cases, however, begin with very distinct menorrhagia, and date their illness from this.

In looking through my notes I find a considerable number of cases in which the patient menstruated for five to seven days, sometimes every second or third week; there is one in which the period lasted nine to ten days every month, and there are two cases in which the bleeding continued for a month. Both these last cases suffered from typical chlorotic anæmia in consequence; in one of them a gynæcological examination was made under chloroform, but nothing was found to account for the menorrhagia. One girl, aged 19, presenting all the most typical symptoms of chlorosis, had for some months been in the habit of passing blood daily when at stool, apparently from a bleeding polypus high up in the rectum.

How important a loss of iron even moderate bleeding entails on the body can perhaps only be realized after calculation. Becquerel and Rodier reckon the iron in 100 g. blood as 0.0366 g. and Pelouze as 0.054 g., so that if we take the mean we have 45 mg. iron in 100 c.c. blood. Now during menstruation 3 to 6 ounces is the average loss of blood, and in this about 45 to 90 mg. iron is excreted—that is to say, about as much iron as a healthy person ingests as food during 5 to 10 days. If we reckon, however, that 5 or 6 mg.[*] are excreted daily in other ways, it only leaves over 3 or 4 mg. per day to make good the loss of iron contained in the shed blood. In the intermenstrual periods the liver stores up from the food reserves of iron, which are immediately available for making new corpuscles, but if these reserves have been exhausted by menorrhagic or other bleeding, or have not been kept up owing to poverty of the food in iron, then the iron, even of a good dietary, is quite inadequate to meet the demand for hæmoglobin, and anæmia gradually results.

Tendency to relapse.—The slightest cases of chlorosis do not very often seek medical advice, as they recover spontaneously on the iron of their food, while many, even severe cases, frequently have no recurrence after treatment, the conditions which induced the anæmia having been evidently temporary. Many cases, however, are never really well; under treatment they recover more or less from one attack, and in a few months have another—this going on sometimes for years. The explanation is that such patients habitually eat too little or habitually lose too much blood by menstruation, or there is often a combination of both. In some cases, also, there is possibly a deficiency in blood-forming activity.

---

[*] *Journal of Physiol*, loc. cit.

Gastric ulcer.—It is well known that obstinate anæmia accompanies gastric ulcer, and this is not surprising, for here we have at work the two most potent factors in causing anæmia, namely, blood-loss and an insufficient dietary as regards iron.

Summary.—All the causes of chlorosis, ordinarily enumerated, may be reduced to two, or possibly three:

1. Excessive menstrual loss, or (much less frequently) other blood-loss. This may be relative, that is, too much for a weakly or rapidly growing organism to bear, or it may be actually large.

2. Insufficient ingestion of iron with food. Anything which diminishes the appetite diminishes the consumption of iron; therefore dyspepsia, constipation, heated rooms, insufficient exercise, unhealthy atmosphere, mental depression, etc., all predispose to anæmia by lessening the amount of food consumed. It is probably owing to change of habits, confinement indoors, and want of fresh air—all leading to small consumption of food— that so many girls from the country become anæmic on coming into towns to live.

In a very large number of cases there is a combination of 1 and 2.

3. It is possible that certain persons are born inherently weak in blood-forming power, and tend to become anæmic under very slight provocation. Such a constitution does not directly cause anæmia, but simply predisposes to it. This would account for cases in which the consumption of food is fairly satisfactory, and there is no particular blood-loss so far as can be made out. In such people, however, nutrition is very active.

Chlorosis in boys and in non-menstruated girls.—This can be explained by the strain thrown on the body by rapid growth and by the conditions mentioned under paragraph 2 above. The anæmia of the menopause, in which the blood condition and symptoms are similar to what is seen in young girls, is palpably due to dyspepsia, insufficient food, and excessive blood-loss.

TREATMENT.

Iron.—When a fully developed case of chlorosis presents itself for treatment clinical experience has abundantly shown that the chief remedial measure is the administration of iron. Whether given by the mouth, by the rectum, or subcutaneously, it is absorbed and utilized for the formation of new corpuscles.* There has been much discussion regarding this, but Macallum † has recently demonstrated its direct absorption from the intestine. It appears to be stored in the liver, and is there converted into an albuminous compound which is the predecessor of hæmoglobin, but exact details regarding the steps of the process are wanting. Treatment by iron ought to be continued for eight or ten weeks, because comparatively little is absorbed and the corpuscles which have been formed during the anæmic state are poor in hæmoglobin; they disappear slowly from the circulation, and are only gradually replaced by others rich in iron.

Any one of the pharmacopœial preparations suffices, as they can all be absorbed, and no one preparation in the present state of our knowledge can be definitely said to be much better than another merely as regards iron. The choice of the particular preparation to be used should be guided to a very large extent by the condition of the stomach. If, as is so often the case, the stomach is irritable, it is best to use the least irritating preparations, such as reduced iron, ferrous carbonate in its various pharmaceutical forms, or one of the scale preparations, and these will be found most generally suitable. Hayem strongly recommends the oxalate, while lactate of iron is also much used in France. The protochloride and sulphate are distinctly more irritating, and the ferric salts still more so. Large doses are generally given, and are held to be most efficacious and rapid in action, probably because more iron becomes absorbed, but many cases recover well in which comparatively small doses, such as 1 g. of reduced iron twice or thrice daily, are administered.

Manganese and *arsenic* given along with the iron are supposed to increase its efficacy. The former is certainly of no use, and the latter is unnecessary. It is supposed to stimulate the formation of red corpuscles, but in chlorotic anæmia such stimulation seems to be rarely required, for as soon as iron in sufficient quantity is supplied, the manufacture of hæmocytes goes on with great rapidity, generally leaving the hæmoglobin lagging behind.

---

* Stockman: *British Med. Journal*, 1893, 1.

† *Journal of Physiology*, 16, 268, 1894.

Diet.—No specific dietetic rules can be laid down for all cases, as the diet must be regulated by the condition of digestion. The most easily absorbed and utilized diet is the best, although, as has been previously pointed out, farinaceous foods contain less iron than flesh. If gastric digestion is good, then an ordinary full mixed dietary is most suitable; on the other hand, if there be severe dyspepsia or gastric ulcer, the diet must be regulated accordingly, so as to give the patient most comfort and the food which can be digested most easily and with most benefit to general nutrition.

Once a patient is markedly anæmic the amount of iron furnished by an ordinary diet can go only a very little way toward providing the iron necessary for recovery. Say that the blood is deficient in iron to the extent of 20 gr., it is evident from what has been previously stated that it will be a very long time indeed before this can be made up from the small amount of surplus iron in an ordinary dietary.

Nasse* states that fat hastens blood-formation, which is confirmed by Cutler and Bradford,† and Ebstein‡ recommends the treatment of corpulent anæmics by means of fatty and albuminous food.

Rest in bed.—Many patients who are severely anæmic do best when kept in bed, and some few recover only after this is enjoined. The explanation seems to be that the most distressing symptoms arise from lack of oxygen and debility of the heart and muscles, so that when complete rest is obtained there is less fatigue, and less oxygen is required for muscular exertion. The supply can therefore be used almost exclusively for purposes of nutrition, and therefore the digestion and general health are improved, so that the food and iron can be better absorbed and utilized. Slighter cases do best with an open-air life and a very moderate amount of exercise (taking care not to overstrain the heart), as the appetite and general nutrition are thereby stimulated.

Improvement of appetite and digestion.—Good general surroundings and personal hygienic treatment of dyspepsia and of constipation are of the utmost importance, as thereby the appetite becomes larger and the patient gets into the habit of taking sufficient quantities of food. The same is true of country air, spa treatment, hydrotherapy, and massage,* all of which may be useful adjuncts to more direct methods of cure. If the patient be not placed under favorable conditions, or remain under the influence of the causes which originally produced the anæmia, then treatment may be inefficacious or very prolonged. For instance, in many factories the girls employed often take Bland s pills as regularly as their meals, and yet they remain more or less anæmic chronically.

Prophylaxis.—Seeing that undue menstrual losses and insufficient food are the two great, if not the only, immediate causes of chlorosis, prevention seems simple enough. If the menstruation is relatively or absolutely too abundant, it can be held in check by giving ergot. In two severe cases of menorrhagia, when ergot did not control the bleeding, I have ordered hot douching with successful results.

More important still is the cultivation of a habitually good appetite and vigorous health, because sufficient iron is thereby ingested, and, as has been previously pointed out, healthy women bear menstrual blood-loss without serious deterioration of the blood. Leichtenstern found that when he lived generously and put on weight his hæmoglobin also increased in amount, and it is obvious that abundance of food means a sufficiency of iron.

---

* *Cbl. f. med. Wiss.*, 1877.

† *Amer. Jour. Med. Sci.*, 75, 1878.

‡ Corpulence and Its Treatment, London, 1884.

* Mitchell: *Amer. Jour. Med. Sci.*, 1894.

Good general surroundings, fresh air, and exercise are essential to a healthy appetite and digestion, and are of the utmost importance in preventing anæmia. Tea has often been blamed for causing chlorosis, but if taken at proper times it can scarcely exercise any deleterious effect. Many women, however, use it as a substitute for food, or take it before their meals, thus diminishing appetite and bringing on dyspepsia, both of which interfere with the ingestion of a normal amount of iron by means of the food.—*Brit. Med. Jour.*

A CHEMICAL AND EXPERIMENTAL RESEARCH ON "ANTIPHTHISIN" (KLEBS).

By E. L. Trudeau, M.D., and E. R. Baldwin, M.D.,
SARANAC LAKE, N. Y.

In spite of the ill-repute into which Koch's tuberculin so quickly fell, many investigators, struck with the specific and selective influence which it exercises on the lesions of experimental tuberculosis, as well as with some favorable clinical observations noted in certain types of the pulmonary disease treated by tuberculin, have persevered in its further study and have attempted to analyze its constituents, to do away with the manifestly dangerous products contained in liquid cultures of the tubercle bacillus, and, if possible, to separate some pure substance which might favorably influence the tuberculous process, or produce in men and animals a certain degree of immunity.

Koch,* shortly after his announcement of the discovery of tuberculin, published the result of his attempts to purify this substance, claiming, however, for the product he obtained no therapeutical advantage over crude tuberculin. Kühne† made a chemical analysis of its component parts, and found that the active substances present in it are of the nature of albumoses.

Baumgarten* obtained temporary cures of eye tuberculosis in the rabbit by treatment with tuberculin. Trudeau† demonstrated, by the treatment of the experimental disease in the rabbit's eye, that the substances which bring about reaction, and, under certain experimental conditions, even temporary cure, are to be found in the filtrate of liquid cultures, and not in a solution or suspension of the washed bodies of dead bacilli, and that the heat used in making Koch's tuberculin precipitates some of the proteids present in the cold filtrate. The studies of Hunter‡ and Klebs‖ were directed more particularly toward the separation by chemical methods of the injurious from the possibly curative elements of tuberculin.

In a communication made in 1892,‖ and in an exhaustive and more recent publication on this subject§ Klebs claims, by chemical methods which he describes, to have separated from tuberculin, and later from the filtrate of over-ripe liquid cultures, a product which, owing to its specific germicidal action, is capable of killing the tubercle bacillus even when intrenched in the living tissues of infected men and animals, and thus curing the disease.

According to Klebs's observations, the cure is brought about, not, as Koch thought, by the power of the specific product to incite a reactionary effort on the part of the body cells, but directly and solely through its germicidal influence on the tubercle bacillus. Klebs, having observed that tubercle bacilli in cultures die when a certain period in their cultivation is reached, holds that they perish because they produce toward the end of their existence in the culture medium a peculiar germicidal substance which destroys them; that, by the chemical processes he describes, he has obtained this specific substance freed from the poisonous alkaloids and albumoses also produced by the microbes during their growth, and present in tuberculin; that he has succeeded in separating from over-ripe cultures this germicidal substance, which he calls "sozalbumose," and that it is the natural specific for this dreaded disease.

---

* Koch: *Deutsch. med. Woch.*, October 22, 1891.

† Kühne: *Zeitsch. f. Biologie*, xii., no. 2, 1892.

* Baumgarten: *Deutsch. klin. Woch.*, no. 19, 1891.

† Trudeau: Transactions of the Association of American Physicians, May 24, 1892.

‡ Hunter: *British Medical Journal*, July 25, 1891.

‖ E. Klebs: *Deutsch. med. Wochenschrift*, April 14, 1892.

§ E. Klebs: Die Causale Behandlung der Tuberculose, 578-81 pp., 1894.

Such deductions, if proved correct, would have so important a bearing, not only upon our existing knowledge of the tubercle bacillus and of the treatment of tuberculosis, but upon the etiology and treatment of many other bacterial diseases as well, that a study of the claims made for "antiphthisin," both from the chemical and experimental standpoints, and of the theory upon which these claims are based, was undertaken by us at the Saranac Laboratory for the Study of Tuberculosis, and an answer to the following questions sought:

1st. *Can a specific substance, differing chemically from the albumoses already known to be contained in the filtrate of liquid cultures of tubercle bacilli, be separated from such cultures in a state of purity by the chemical methods proposed and described by Dr. Klebs?*

As the directions giving by Dr. Klebs for the preparation of "antiphthisin" were evidently intended to be sufficient for the guidance of others who might desire to prepare this substance, we preferred not to limit our chemical study to an analysis of his own product, but to include in our research a test of the chemical problems involved in the process of manufacture as laid down by him.

In order to ascertain the nature of "antiphthisin" we prepared large quantities of it according to the directions given, which were closely followed.

"Antiphthisin" is stated by Klebs to resemble "tuberculocidin" (the name given to a former preparation), but is made directly from the fluid filtered from the over-ripe bouillon cultures without heat, instead of from crude tuberculin, as is the latter. The same method is used in both, but the "antiphthisin" presumably contains more of the active albuminoid substances, because some are removed by heat in the manufacture of tuberculin, from which "tuberculocidin" is made.

Kühne* examined 100 c.c. of Klebs's "tuberculocidin" and found a small amount of deutero-albumose and traces of peptone as the ingredients, excepting the phenol used to preserve it and inorganic salts. The albumoses, etc., resembled those contained in the peptone of the culture medium, though possibly derived from the bacilli. The important step in making these modifications of tuberculin is said by Klebs to be the removal of harmful, fever-producing substances by precipitation with sodium-bismuth-iodide (a reagent used to separate alkaloids) in acetic acid solution. The useful germicidal substances are assumed to be retained in the filtrate, which is then treated with NaOH to remove the bismuth. This being filtered off, absolute alcohol is added to the filtrate. The resulting precipitate collected and dissolved in water is called "antiphthisin." This is preserved in 0.2 per cent. trikresol, and is made of $\frac{1}{2}$, $\frac{1}{6}$, or $\frac{1}{10}$ bulk of the original culture fluid.

We first procured some potassium-bismuth-iodide through the kindness of Professor C. E. Colby (Columbia College, School of Mines), and with this made several samples of "antiphthisin." Later, with sodium-bismuth-iodide prepared by ourselves, we made larger quantities.

Seven flasks containing 900 c.c., covered with thick pellicles beginning to sink, and all showing a rich growth of ripe, pure cultures grown from December 20, 1894, to February 18, 1895—eight and a half weeks—on peptone-bouillon, were filtered free of bacilli, and 12 c.c. of trikresol, twenty per cent. solution in glycerine, added as a preservative. After standing twenty-four hours sodium-bismuth-iodide was added until no further precipitation occurred, the reagent being first treated with sodium acetate and acetic acid. To avoid great excess, the quantity of the precipitant needed was first closely determined by titration three times with 5 c.c. of the culture fluid. The bulky, red precipitate was settled and filtered; the filtrate tested gave no further precipitate with $NaBiI_4$; NaOH (norm.) added until reaction just alkaline; warmed, settled, and filtered, free of Bi $(OH)_3$; to the clear filtrate absolute alcohol added until no further opalescence produced. The final precipitate, washed with absolute alcohol and dried, was readily dissolved in 70 c.c. distilled water.

---

* Kuhne: loc. cit., p. 252.

EXAMINATION.

Color—light straw (resembled "tuberculocidin" obtained in market).
Odor—none (without trikresol).
Reaction—slightly alkaline.
+ heat = O + acetic acid = O (absence of albumin).
+ $NaOH$ + $CuSo_4$ = rose color distinct (indicative of albumoses or peptones).
+ $(NH_4)_2$ SO_4 (saturated) = opalescence albumoses ?).
+ $NaCl$ (saturated) = O + acetic acid = opalescence (deutero-albumoses ?).
+ $PtCl_4$ (excess) = opalescence (not found by Klebs).
+ $NaBiI_2$ + acetic acid = precipitate (the first was evidently incomplete—not found by Klebs).
+ HCl + H_2S (warmed) = O—(absence of Bi).
+ HNO_3 (conc.) + starch paste = O (absence of I).

The above reactions and others indicated that we were dealing with an albumose, or peptone-like body, which was incompletely precipitated by the first treatment with sodium-bismuth-iodide. The whole quantity remaining was therefore again treated with sodium-bismuth-iodide in acetic acid. This time there was much less "antiphthisin," and by a third treatment it was possible to completely remove all of it—no proteid being left.

These results show the absence of any substance different from the albumoses already described by Kühne as deutero-albumose, produced by the bacilli in very small quantities.

Klebs thinks this substance to be elaborated by the bacilli in growing. To test this point we treated some unplanted bouillon by the same method above described.

Two hundred and fifty cubic centimetres gave a residue identical in appearance and reactions with that obtained from the cultures. It was, however, less in quantity than that obtained from cultures of same bulk.

As it was evident that some of the albumoses, etc., in the original culture—*i.e.*, contained in the peptone or meat extract—might be in the product called "antiphthisin," we prepared some from peptone-free cultures, grown on the asparagine fluid suggested by Schweinitz.* 475 c.c. of this gave a trace of "antiphthisin," which from its reactions resembled a deutero-albumose. Obviously this must have been derived from the bacilli, because a control experiment with the culture fluid gave nothing. A second treatment of the presumably pure "antiphthisin" with sodium-bismuth-iodide completely precipitated the proteid substances.

Some experiments with deutero-albumose were next made to determine whether this is incompletely precipitated by sodium-bismuth-iodide. This substance was prepared in a fairly pure condition from Witte's peptone by the method of Kühne and Chittenden. It was then made up into the usual bouillon culture medium mixture, being substituted for the peptone in like proportion. When treated with sodium-bismuth-iodide, etc., a small residue, identical in its appearance and chemical reactions to the "antiphthisin" obtained from ripe cultures, was found to be present.

A similar proteid residue was obtained from a mixture of Liebig's extract of meat, sodium chloride, and glycerine in the usual proportions for culture media. Meat extract is known to contain a small quantity of albumoses.

Some experiments with the object of determining the reason for this incomplete precipitation of albumoses, particularly deutero-albumose, incline us to think it due to several causes. It may be due partly to the presence of neutral salts in which these albumoses are very soluble, and possibly because of slight solubility in excess of the reagent. The amount of acetic acid present seemed to bear no relation to the amount of "antiphthisin" produced. By careful precipitation it was possible to remove all the albumoses in the first treatment.

---

* Schweinitz: *New York Medical Journal*, February 3, 1894.

The components of tuberculin, so far as known, can be best compared with those of "antiphthisin" by the following table:

Tuberculin (crude)	From the culture medium unaltered.	Glycerine.	
		Inorganic salts.	
		Extractives from meat.	
		Albuminat.	
		Albumoses	proto- hetero- deutero-
		Peptone.	
	From the bacilli as a result of growth.	Albuminat (?) (doubtless a nucleo-proteid).	
		"Acroo-albumoses" (Kühne).*	
		Deutero-albumose (small amount).	
		Peptone (possible trace).*	
		Alkaloids (?).†	
		Protein (?) from bodies of the bacilli.	
"Antiphthisin" and "Tuberculocidin."		Inorganic salts.	
		Deutero-albumoses.	(*very* small amount and partly from the culture medium.)
		Peptone (?)	
		Trikresol.	

Many animal tests were made with "antiphthisin" of one-tenth volume of original culture fluid. Doses from 0.5 c.c. to 3 c.c. seldom produced appreciable effects on tubercular guinea-pigs and rabbits when administered at various stages in the disease. In doses of 5 c.c. elevation of temperature was produced, and one pig was killed by that dose, showing characteristic tuberculin-reaction lesions. Ten cubic centimetres caused marked congestion in the tubercular eye of a rabbit, with a temperature rise of from 102° F. to 105° F.

The effects of large doses of "antiphthisin" were similar in all respects to those produced by small doses of tuberculin.

It is interesting to note in this connection that Mathes‡ found that deutero-albumose (and others) made from Witte's peptone produced effects on tubercular animals identical to those of tuberculin when given in sufficient quantity. We have confirmed this.

2d. *Has "antiphthisin" any germicidal action on the tubercle bacillus in vitreo?*

Six cubic centimetres of a suspension of a virulent culture of tubercle bacilli on serum having been made in water, 0.5 c.c. was injected subcutaneously in the thigh of four control pigs. Three cubic centimetres of the same suspension were now mixed in a little sterilized beaker with 3 c.c. of pure "antiphthisin" prepared by us as stated above, allowed to stand six hours at the room temperature, and 1 c.c. of the mixture injected into five pigs in the same manner as in the controls. All the animals died within two months.

The average life of the controls was fifty days. The average life of the test animals receiving the cultures which had been left six hours in contact with "antiphthisin" was thirty-nine days. The lesions of the test animals differed in no appreciable manner from those noted in the controls.

3d. *Do "tuberculocidin" or "antiphthisin" exert any curative influence over the course of experimental tuberculosis in the guinea-pig?*

Twelve guinea-pigs were each inoculated in the inner aspect of the thigh, subcutaneously, with 0.5 c.c. of an emulsion made from tubercular glands and peritoneal tubercles taken from a rabbit dead with acute tuberculosis. Six were kept as controls, and treatment of the other six was begun by injecting subcutaneously on the following day, in each, 0.25 c.c. "antiphthisin" one-tenth conc.

Injections were continued every second or third day and the dose gradually increased, so that within a month the animals were receiving each 1.5 c.c. "antiphthisin." The dose was then reduced to 1 c.c., and injected at intervals of two or three days until death.

The average duration of life for the control animals was thirty-nine days; for the treated, thirty-three days. In two of the treated animals the extensive tubercular lesions found in all showed bluish congestive areas such as are usually seen in tubercular guinea-pigs injected with Koch's tuberculin. Otherwise the post-mortem appearances were about the same in both sets of guinea-pigs.

A similar experiment was also made with

---

* Kühne: Loc. cit.

† Crookshank and Herroun: *Journal of Physiology*, vol

‡ Mathes: *Deutsch. Arch. f. klin. Med.*, S. A., 1894.

"tuberculocidin" purchased in open market, with materially the same results.

4th. *Is the death of the germs in over-ripe cultures due to the formation of a specific germicidal substance in such cultures, or to some other cause?*

Dr. Klebs s observation that if a culture medium in which tubercle bacilli have once developed be replanted no growth will occur, was several times confirmed by us. In testing carefully, however, such a medium before planting, and after the germs have ceased to develop on it, it was observed that its reaction had become markedly changed.

Peptonized glycerinated bouillon ready to plant with tubercle bacilli should be either neutral or faintly alkaline, but after an abundant crop of the bacilli has developed on its surface it may be noticed that its reaction has become more or less markedly acid, according to the depth of the culture medium in the flask and the richness of the growth. Whether this acidity is brought about merely by the abstraction from the medium of some of its alkaline constituents for the needs of the growing germs, or by the addition to it of an acid substance produced as the result of the microbes' metabolism, has not yet been accurately determined, and the cause of this acidity offers a subject for further study; but as "antiphthisin" is alkaline, no germicidal influence can be claimed for it on that ground. It seemed to us not improbable that the failure to obtain a second growth on such a medium, if replanted, might be due simply to its acid reaction alone, and the following experiment to determine the correctness of this hypothesis was therefore made:

Having grown cultures of tubercle bacilli on peptonized glycerinated bouillon for seven weeks, until the thick pellicle formed by the germs began to look humid and sink at the sides, a few drops of a sterilized solution of NaOH was added to the culture fluid until the acid reaction found to be present in it was changed to a perfectly neutral one. This neutralized medium was then filtered through a previously well-sterilized Kitasato filter into small sterilized flasks. Fresh plants of actively growing tubercle bacilli were made in all of these, and the entire lot placed in the thermostat at 39° C. No contaminations occurred, and, as is not uncommonly observed in the cultivation of the tubercle bacillus, but little growth took place during the first two weeks. From that time, however, the pellicles began to spread and thicken in the usual way, and five weeks from the day of planting the entire surface of the flask was covered with a rich growth.

Conclusions.—1. The substance made according to Klebs's published method, and called by him "antiphthisin," resembles deutero-albumoses in its chemical reactions, and can be precipitated by sodium-bismuth-iodide. Hence it has no peculiarity of behavior to that reagent to distinguish it, and as a similar substance can be obtained from unplanted bouillon, it cannot be considered an altogether specific product of the tubercle bacillus.

"Antiphthisin," prepared according to Klebs's published method, is practically highly diluted tuberculin, and its physiological effect on animals, when given in sufficient doses, is the same as tuberculin.

2. "Antiphthisin" possesses, under the conditions stated above, no germicidal power on the tubercle bacillus which can be demonstrated *in vitreo.*

3. When applied to animals, as stated above, neither "tuberculocidin" nor "antiphthisin" had any curative influence over the course of experimental tuberculosis in the guinea-pig.

4. Since cultures of the tubercle bacillus become acid as they grow, and, furthermore, since the addition without heat of a little alkali to a filtered culture medium upon which bacilli have ceased to grow renders it again fit for the development of a second crop of germs so long as any nutriment remains, it may be inferred that the limitation of the growth of the tubercle bacillus in such a culture medium is most likely due to the acidity induced in the medium, rather than to any specific germicidal substance produced therein.—*Med. Record.*

THYREO-ANTITOXIN.

Ever since it has been known that extracts of certain organs and tissues exercise a specific action upon the body, chemists have attempted to isolate the constituents to which this action can be attributed. Besides the thyroid glands, the suprarenals, pituitary, pancreas, and a number of others have been found to be physiologically active when ingested or introduced into the system in the form of extracts; and preparations of various of these glands have already reached considerable therapeutic significance. It must be confessed, however, that chemico-physiological investigation in this direction has not yet made so great advances as is to be desired; the thyroid has received by far the most attention.

Professor Schäffer, of London, and Dr. Roos, of Freiburg, have shown that the physiological action of thyroid extracts is not destroyed by boiling, by ten per cent. hydrochloric acid, nor by ten per cent. sodium hydroxide. The fact that thyroid preparations are active when taken *per os* at once gives evidence that the effective substance is not injured by the digestive juices. The difficulty in isolating and identifying this substance lies partly in the fact that we have no chemical reactions for it as yet, and must turn to less certain experiments on animals and man to determine the influence, or value, of various preparations obtained from the gland.

Dr. Sigmund Fränkel,[*] of Vienna, has published a preliminary communication regarding some new facts about the thyroid. In order to determine whether its physiological action is due to proteid substances the nucleo albumins, etc., were removed from extracts of dried sheep's thyroids by precipitation with acetic acid. This precipitate, thoroughly washed, was fed to two corpulent men and a dog No decrease in weight was observed, although the proteids from seven sheep's thyroids were fed daily to each for a period of ten days

The neutralized filtrate, however, was active: a daily loss of 300 grams during six days was observed in one case, and a noticeable increase in the pulse-rate was produced. Thyroid extracts were therefore treated with lead acetate in the usual way for removing albuminous and gelatigenous matter. From the filtrate, free from lead, a crystallizable substance could be obtained after concentration and treatment with alcohol and ether or acetone. The elementary analysis suggests the empirical formula $C_6H_{11}N_3O_5$. A study of the reactions of this body leads to the assumption that it is a derivative of guanidine or of succinic acid, but further investigation is necessary. Fränkel terms the new substance ***Thyreo-antitoxin.*** Injections of a few milligrams into the jugular vein of a morphinized dog quickly brings about an acceleration of the pulse from 56 to 80, 120, or even 140 beats per minute, an effect similar to that obtained by Dr. Haskowetz, of Prag, with extracts of fresh glands. Furthermore, the thyroid glands were removed from young cats—which animals are exceedingly sensitive to this operation—and upon appearance of the characteristic spasms, one per cent. watery solutions of thyreo-antitoxin were injected subcutaneously. In some cases the result was most marked. Animals which previously lay motionless began to breathe more rapidly, they recovered their reflexes, the rigor of the extremities relaxed, and they speedily improved. In some instances the spasms did not recur until death, which followed in a few days; in other cases recurring spasms subsided again after fresh injections. In some of the animals treated with thyreo-antitoxin immediately after the thyroidectomy, no spasms occurred before they died. Professor Gley, of Paris, has likewise found that injections of thyroid extracts prevented these spasms, or caused them to subside, but that young animals, nevertheless, all die in a few days after the operation.

From his investigations Dr. Fränkel concludes that the physiologically active constituent of the thyroid is a well-defined chemical substance, which is present in considerable quantity, and the action of which will explain all the therapeutic properties of the gland. He suggests that the use of a compound thus isolated, which may in time be synthetically prepared, will prevent many of the undesirable results following the use of worthless or injurious thyroid preparations, and he believes that the results point toward the discovery of other individual chemical substances as the active constituents of various organs. While recognizing fully the importance and credit attached to such investigations as the above, the writer would call attention to the fact that further observations seem desirable before the real value of such thyroid preparations can be determined by the present method of animal experiment. Dogs, for example, may recover from the characteristic spasms after thyroidectomy without any treatment. In some instances the spasms are wanting; occasionally variations in diet or injections of apparently indifferent substances may relieve them. A more certain test of the action of thyroid preparations than their effect on animals after thyroidectomy is desirable, or else a more extensive series of observations, so that the factors referred to may be sufficiently taken into consideration.

---

[*] *Wiener med Blätter*, no. 48, 1895.

SERUM-THERAPY IN LEPROSY.

NEW YORK, Nov. 21, 1895.

To the Editor: Mr. Luther F. McKinney, United States minister in Bogota, writes me (Oct. 17, 1895): "I enclose an article written by Dr. Putnam, of this city, in which I know you will be interested. Dr. Putnam has taken a great interest in the subject of leprosy and, as you will see, believes in the theory that the disease can be cured by the injection of the blood of an animal previously inoculated with the serum from the blood of a leprous patient. He has one patient, a woman here in Bogota, whom he has been treating in this way for about four months. When she began there was an entire loss of sensibility of the arms and lower limbs, and large leprous blotches or sores on her arm. She has entirely recovered the sensibility of the arms, but not of the lower limbs; the blotches on her arms have entirely disappeared; so says the doctor. There are ten physicians here who are watching the case with great interest and have great hopes that extraordinary results will be obtained. The great trouble here is that there is no laboratory for the proper preparation of the serum, and the lack of proper apparatus for the carrying on of the experiments very greatly retards the investigations. To show how the medical profession is hampered in their efforts to stay this foul disease, some time ago Dr. Putnam wrote a letter to the president of the republic, explaining to him his theory and saying that he proposed to carry on the work and visit every part of the country where leprosy existed, and called the attention of the executive to the assistance rendered by other civilized governments in the development of the scientific study of these diseases, and suggested that the government provide a laboratory for the purpose of assisting in the work. The president instructed the minister of education to answer the letter, and say that while he thought the purpose of the doctor was good, it was a matter of personal interest, and the government did not desire to have anything to do with it. And this while there are 27,000 lepers in the country, and the minister who answered the letter lost his wife by the disease, and has two leprous daughters in his home at the present time. In about a month Dr. Putnam will visit the hospital again, and he says the first leper who dies while there, he will get a portion of the skin, muscle, liver, and brain and send them to you."

The article which Mr. McKinney enclosed to me is entitled "Sero-Therapy," and was published in the *Herald* of Bogota, Oct. 10, 1895. In it he makes a report of a medical visit to the Lazaretto of Aqua de Dios, and the sero-therapeutic medication which he has begun there in a formal manner in the treatment of leprosy. He refers to an official offer, made by him on the 22d of last May, to carry on the project of establishing sero-therapy in Colombia. He had already begun this treatment on some private leper patients before going to Aqua de Dios. He refers to a grand lecture given by Dr. Juan de Dios Carrasquilla, in the Policlinic of Bogota, the 1st of last July, on this subject. This lecture has guided him in his experiments, and Dr. Juan de Dios Carrasquilla will be his consultant in future. At Aqua de Dios he obtained a leprous serum to be inoculated in several animals in a manner advised by Professor Ricket in syphilis, and which consists in taking some blood from the patient, inoculating the animal and returning from the animal to the patient. "In one word," says he, "to make the cultivation of the leper bacillus in the blood of an animal, instead of making it in a special apparatus for the purpose of strengthening natural immunity in the animal, for the experimental infection." He visited the hospital with the Rev. Father Crippa Salesiano, who has devoted himself to the patients, and Dr. Luis L. Gaitán, physician of the Lazaretto, and selected an adult of 16 years in whom tubercular lepra was in full development. He took from his arm 250 grams, into an aseptic bladder, and put the latter carefully away, leaving the blood in repose for four hours, during which he prepared the animals for the inoculation. There were two asses and three she-goats. At the expiration of the four hours he separated the serum and inoculated a certain quantity into the animals. These animals were to be kept under supervision for several days. With the blood-serum of these animals he intended to inoculate thirty or forty patients early in November.

Mr. McKinney encloses me the reply received by Dr. Putnam to his application to the Colombian Government:

> "Republic of Colombia, Office of Secretary of the Government. No. 2540.
>
> Bogota, Oct. 17, 1895.
>
> "Dr. Carlos E. Putnam:
>
> "*Sir*—Regarding your report with respect to the installation of the sero-therapy in the Lazaretto of Aqua de Dios, I have to answer that the government, reiterating to you its manifestations of approbation and very much interest in the success of the experiments which you have undertaken with so much devotion, will give to you all the moral support necessary, so that you may not be discouraged for continuing such a praiseworthy enterprise."

Dr. Putnam writes me: "We have 27,000 lepers! We do nothing for them! The acting government pays no attention at all! We are lost!"

"Think of offering a starving man moral support," says Mr. McKinney. "Unless the Government takes the matter in hand the country is lost indeed. Forty years ago there were 400 lepers in Colombia, now there are more than 27,oco. How many at this rate of increase will there be in forty years from now?"

Albert L. Ashmead, M.D.

270 W. 43d Street.

—*The Journal.*

ALCOHOLISM IN FRANCE.

Dr. Barthés, in a report read before *L'Association Française pour l'Avancement des Sciences*, at its late meeting in Bordeaux, gives some very discouraging statistics concerning the ravages made by alcohol in France. In some communes the mortality among the infants of alcoholic drinkers has reached as high a percentage as 62 per cent. of those under the age of two months. According to the doctor, the great abuse or consumption of alcohol began in 1855, when there was an almost total failure of the wine production. From the statistics of 200 towns there is noted a great and steady increase of infant mortality, as well as a notable increase in the number of still-born, which have been traced as being directly due to the abuse of alcohol. The effects of this increased use of alcohol upon the physique has also greatly increased the number of exempt from army service. The drain upon the finances of many departments is on a yearly increase, due to the increasing number of the alcoholic insane which fall to the public charge. Dr. Barthés considers the use of wine as an antidote or preventive to that of alcohol, basing his opinion upon ten years' observation in the Eastern Pyrenees, where wine is exclusively in use and where he never encountered a single case of alcoholism.—*Pac. Med. Jour.*

Department of Hygiene.

WITH SPECIAL REFERENCE TO STATE AND PREVENTIVE MEDICINE.

Edited by E. O. SHAKESPEARE, M.D., PH.D.,

(PHILADELPHIA.)

PURE MILK AND BOARDS OF HEALTH.

ON the 23d of January there was a most important discussion on the subject of pure milk by the Associated Boards of Health of the State of Pennsylvania, abstracts of which will appear in a subsequent issue of the GAZETTE. The information and opinions set forth in many of the prepared papers and in the discussion which followed cannot fail to have general application and interest.

They possess an especial interest, however, for the citizens of Pennsylvania. We have more than once in these columns referred to the incongruous milk code of Pennsylvania, and to the totally inadequate regulation of the production and sale of milk in that State. The heterogeneous milk statutes of that State are no credit either to the wisdom and impartiality of the legislators or to the public spirit and intelligence of the citizens who nominate and elect them. More than this, as we have on a former occasion pointed out, it all too frequently happens in that State that the judiciary nullify the little protection which the lax milk laws of Pennsylvania may afford for the health of the consumer by an exercise of the discretionary power vested in the judge to suspend sentence upon a convicted malefactor. It is indeed a misfortune to the little ones whose birth or lot places them in Pennsylvania, if they are obliged to live upon cow's milk, that there sit upon the bench judges so shortsighted that they fail to see beyond the milk adulterator convicted in a fair trial the hundreds of helpless little ones whose food has been practically poisoned through his nefarious act.

If there is any State in the Union whose milk laws need to be greatly reformed in the interest of the health of the consumer it is certainly Pennsylvania.

The sessions of the Legislature of that State are biennial, and there is no meeting until next year. During the previous session the dairy and the agricultural interests were supreme, and a number of laws were enacted through their influence for their special benefit. The interests of the public health, in so far as it is related to dairy products, were ignored by that legislature. At the biennial session prior to the last the public health fared no better, although there was a strenuous effort by the friends of public health to secure adequate legislation to prevent adulteration and infection of milk. The lobby of milk-dealers from Philadelphia and their dependent dairymen, strong in political influence and cash, was too powerful at Harrisburg for the humanitarian friends of the babes whose sole or principal food is cow's milk.

This effort failed of immediate fruition, but the friends of public health and the parents of the long-suffering little ones need not, on that account, despair of ultimate victory, even in that State. The soil was prepared and the seed sown broadcast and deep. A winter or two has swept over the sown field since, but many of the implanted seeds are at last beginning to show signs of germination. This meeting at Harrisburg of the associated boards of health in Pennsylvania is a strong indication that the battle for pure milk in the interest of the consumer is to be renewed and vigorously fought before the next legislature by the earnest friends of public health from every section of the State acting in concert.

There is good ground to hope, therefore, that even laggard Pennsylvania may at last assume the place in the van of progress in protection to public health which the second greatest State in the Union should of right occupy.

INDIA APPEARS TO AWAKEN.

WE are pleased to note some signs that the British and East Indian Governments are at last awakening to the fact, long known to the rest of the world, that their administration of sanitation and preventive medicine is of the most perfunctory and antiquated nature.

The conference of the European governments with those of the United States, Turkey, and Persia at Paris in the winter of 1894, and the later bold and effective exposure by Ernest Hart, editor of the *British Medical Journal*, of the wretched and incompetent administration of affairs relating to state medicine in Hindostan, have at length prodded the stubborn and indifferent Briton into an apparent movement of reform in the East. We hope this movement will not end in appearances, but will prove to be realistic and lasting.

Although this movement in the right direction is late and has been exceedingly reluctant—a response to vigorous and continued pressure—there are enough earnest, capable, and competent modern sanitarians in the East Indian service to-day, we trust, to influence the Viceroy and his council to pursue a wise course of radical reform in state medicine consonant with the requirements of modern knowledge, if only the antiquated owls in India and England, whether in active service or retired upon pension, are not accorded too much consideration for the wisdom which their many years and exalted positions should have brought them.

The bane of sanitation in India has heretofore been just the dominant influence of these "antiquated owls" who have sat upon the high seats to administer and control state medicine. In the twilight of sanitary science, their wide-open eyes and their exalted perches may really have given them some advantages of perception in the surrounding gloom over less fortunate species of the feathered tribe, and the fabled mien of wisdom attributed to them may not so frequently have had a suggestion of ridicule. But in the glare of the broad daylight which pervades the present hour in preventive medicine, their great round eyes, and possibly also their exalted perches, make them hopelessly blind, and the mythical attribution of wisdom in their uneasy situation becomes supremely ridiculous.

When the Government of India calls into council and acts upon the advice of such men as Dr. Simpson, the accomplished and efficient Health Officer of Calcutta, and Prof. Hankin, the Bacteriologist and Sanitarian of the Northwest Provinces and Oudh, the world outside of Hindostan will have some assurance that something effective will be done to check the periodical excursions over the earth of Indian cholera.

MORE ABOUT PUBLIC SPITTING.

WE notice with pleasure an early response to our recent editorial on the noxious habit of expectoration in public places so common among Americans. The ladies of Brooklyn have already moved to inaugurate a quiet although effective crusade to curtail the nauseating and dangerous practice. These powerful allies of cleanliness have quickly transformed their determination into acts in the proper direction. They have waited upon the governing power of a number of corporations who are common carriers and others who are proprietors of places of public assemblage and politely but earnestly represented the importance to the public of doing what can be easily accomplished by these corporations and individuals in the cause of public health and decency through checking the habit of expectoration upon their property.

These ladies have not only been well received by the persons whom they have visited upon this worthy mission, but as a rule have met with a manifest willingness on the part of these persons to lend their substantial aid in promotion of this important cause. Many of the corporations visited have promised to furnish printed placards for posting in public places (including their own premises) against spitting.

We mention this movement of the ladies of Brooklyn as a stimulus and encouragement to the ladies of other cities to take up and push forward this good cause. We have no doubt that the public carrier corporations and the proprietors of places of public assemblage everywhere will gladly welcome and give substantial support to the assistance of public-spirited ladies in the effort to create such a public sentiment as will result in the cleanliness and freedom from infection of the premises and property of public carriers and places of public entertainment and assemblage.

We earnestly invoke the aid of ladies in other cities for the active support of this crusade in the interest of public health.

◆

A STUDY OF THE INFECTIOUSNESS OF THE DUST IN THE ADIRONDACK COTTAGE SANITARIUM.

By Irwin H. Hance, M.D.,
NEW YORK.

Associated with our increasing knowledge of germ life and the practical application of bacteriology toward solving the cause of disease and tracing back to its fountain-head the source of any infection, there exists among the laity and also some physicians an intense fear, sometimes amounting to mania, that they are continually exposing themselves to an invisible danger which is lurking about them in the food they eat, the water they drink, and the air they breathe. The most dreaded nightmare of them all is the fear of becoming infected with the germs of tuberculosis. No one can deny the presence of this danger in a great many places; but oftentimes in the places where popular opinion considers it greatest it is actually less to be dreaded than in other localities where with the external appearances of refinement and cleanliness there exist the most favorable conditions for the permanent lodgment of infectious material in the dust.

This fear of infection from tubercular germs has become so general and reached such a climax that the poor tubercular patient whose mental and physical suffering is already extreme must carry around with him an added burden of anxiety and care, since people look upon him as a dangerous character in the home or community. It is within the writer's experience that parents have refused to have their children return home lest some other member of the family might be infected; and men have found it difficult to hire flats in New York City or Brooklyn when they wished to make a home for a dying wife or child. In one instance a physician wrote to have his former patient kept in Saranac Lake until she died, as he thought that was the only way of avoiding possible infection for the other members of her family; in the end she was taken home to die in a hospital.

Such heartless actions are due to a great extent to the ignorance of people concerning the real dangers of infection, and their lack of knowledge as to how they can be avoided. In their blind ignorance they think to avoid an apparent danger, little dreaming how much more frequent and dangerous are the daily exposures to the same diseases in their social intercourse, travels, and amusements.

For these reasons it has seemed a fitting time to make some experiments on this subject to determine how great the danger of infection is in a large community of consumptives where all sanitary measures are enforced as regards the care and disinfection of sputa.

Two facts have been positively affirmed by previous experiments: 1. Buildings for consumptives, prisons, private dwellings, and public conveyances do become infected with tubercular germs. 2. A tuberculous patient is absolutely free from the danger of infecting others by contact ; it is the product of their excretions which is the dangerous factor. Destroy these and the house or home of the consumptive is no longer dangerous.

All investigators have established the first of these two statements, none more thoroughly than Cornet,[*] reference to whose work will be made later in this paper.

The second statement has also been repeatedly proven; but among the laity and also some physicians it is so dimly comprehended that time will not be lost in quoting some of the investigators and their experiments.

Two Italian investigators, Celli and Guarnieri, found the expired air of tubercular patients free from tubercle bacilli, and also that air blown by a bellows over and through sputum very rich in bacilli remained free from bacilli.

Fr. Muller,[†] Sormain and Brugnatelli,[‡] Charrin and Karth,[§] Cadeac and Malet,[‖] all found the expired air non-infectious.

For two months Tappeiner[¶] had a woman with advanced phthisis cough through an opening into a wooden box in which were two guinea-pigs; at the end of that time they were killed and found sound.

Cornet[**] states that the expired air "never and under no conditions contains tubercle bacilli or their spores."

Since, then, personal contact with a tubercular patient is free from danger, whence is the source of the infectious material? For all practical purposes it is contained in the sputum, which becomes dangerous and capable of infecting when dried and pulverized. In its moist state it is harmless; therefore, if tubercular patients are careless and dirty about their sputum they are dangerous, not alone to themselves, but to all who come in contact with them.

Knowing these facts, and taking pains to make them clear to the patients in the sanitarium, it may well be said, after five years of personal observation, that the rules concerning the care and disinfection of sputum have been since its inception and are to-day most carefully carried out there. Occasionally a very sick or careless patient does transgress the rules, but this occurs very seldom for such a large institution.

In order to test the efficacy of the system a complete examination of the group of buildings was made, some of which have been occupied eleven years by consumptives. In every instance dust from the darkest and most likely to be infected spots was taken; for if infected the management was most desirous of knowing it.

The experiments were done at Dr. Trudeau's request and under his supervision at the Saranac Laboratory for the Study of Tuberculosis. They were arranged in two groups, the details of which were as follows: First group of four buildings consisted of the main building (parlor, sitting-room, and public library); the infirmary where all the acutely sick are sent; the "Red Cottage," which was the oldest on the grounds, and the "Penfold," the most recently built cottage. One square yard of dust from each of these buildings was collected and inoculated into ten guinea-pigs. Second group consisted of thirteen cottages, from each of which half a square yard of dust was taken and inoculated into three guinea-pigs; thus the second batch of pigs received proportionately a larger quantity of dust than the first.

The technique was as follows: Sterilized cotton swabs moistened with sterilized water were used to collect the dust from the walls, backs of pictures, and darkest corners of the rooms; 1 to 2 c.c. more of sterilized water was added to cleanse the cotton of the dust. The swabs were then squeezed in a piece of coarse sterilized gauze, and an equal share of the whole dust, suspended in water, inoculated into each guinea-pig; all inoculations were made into the abdominal walls, extraperitoneal. Save for any infections in the dust, all other sources of examination were excluded by thorough antiseptic precautions.

---

[*] Cornet: Die Verbreitung der Tuberkelbacillen ausserhalb des Körpers. *Zeitschrift f. Hygiene*, B. 5, 1888.

[†] Fr. Müller: Ueber die diagnostische Bedeutung der Tuberkelbacillen. Würzburg, 1883. *Verhandlung der med. phys. Gesellschaft zu Würzburg*, N. F. Bd. viii.

[‡] Sormain and Brugnatelli: Studi sperimentali sub bacillo della tuberculosi, 1883.

[§] Charrin and Karth: Virulence de la tuberculose suivant les humeurs et les tissues des tuberculeaux. *Revue de Méd.*, 1885, No. 8.

[‖] Cadeac and Malet: Étude experimentale de la transmission de la tuberculose par l'air expiré et l'atmosphere. *Revue de Méd.*, 1887, No. 7.

[¶] Tappeiner: Meran zur Frage der Contagiosität der Tuberkeln. *Archiv für Medicin.*, Bd. xxix., S. 59.

[**] Cornet: Loco citato.

The animals were kept from one to three months and then killed. Any enlarged glands or suspicious areas were carefully examined for tubercle bacilli, and the diagnosis of tuberculosis only made when these were found. In the painstaking details of these prolonged experiments the writer wishes to express the appreciation of the assistance given him by Dr. S. W. Hewetson, who aided him materially in the work.

The results are shown in the following table, which is arranged under the same heading as in Cornet's work in order to compare the results:

Places.	Number of Animals.	Of which Died of		Died of Infectious Diseases.		Remained Sound.	Amount of Dust Used.
		Tuberculosis.	Other Infectious Diseases.	All Told.	In percentage to Inoculated Animals.		
Main Building:							Sq. Yd.
Parlor, Sitting Room and Library..........	10	0	1	1	10	9	1
Infirmary......	10	0	3	3	30	7	1
Red Cottage...	10	5	0	5	50	1	1
Penfold.... ..	10	0	0	0	0	10	1
Loomis	3	0	0	0	0	3	½
McAlpin.......	3	0	0	0	0	3	½
First Stokes....	3	0	0	0	0	3	½
Second Stokes..	3	0	0	0	0	3	½
Green	4	0	0	0	0	4	½
Lea............	3	0	0	0	0	3	½
Spruce	3	0	0	0	0	3	½
Trudeau.......	3	0	0	0	0	3	½
Pine..	3	0	0	0	0	3	½
Sunshine.......	3	0	0	0	0	3	½
Schiff..........	3	0	0	0	0	3	½
Dodge..........	3	0	0	0	0	3	½
Strauss........	3	0	0	0	0	3	½
Out-building...	1	0	0	0	0	1	¼
Thus of....	81	5	4	9	11.11	72	

In all 81 pigs were inoculated with from 2 to 3 c.c. of sterilized water with the dust in suspension; of these only 4, or 4.9 per cent., died of other infectious diseases on the third to sixth day and 5 of tuberculosis. The 5 constituted just one-half of the number of pigs inoculated with dust from the "Red Cottage," a small cottage holding two patients, always occupied by the sickest men, one of whom had been complained of by his room-mate for spitting around the cottage. The 5 pigs lived sixty days, were then killed, and although tuberculosis was present in the omentum, spleen, liver, and lungs, they were well-nourished and strong, apparently showing a diminished virulency of the infecting germs.

The infection of this cottage demonstrates two things: First, how easily a patient by carelessness and disobedience of rules (probably due to his very weak, sickly condition) may render a cottage dangerous to himself as well as to others; second, that the technique of the experiment was faultless.

It brings out, however, in stronger contrast the successful results of the experiment as a whole, since sixteen buildings out of seventeen, inhabited by consumptives for so long a period as ten years, were absolutely free from infectious material. This is the more striking when we consider the great vitality and virulence of the tubercle bacilli, Stone[*] having proven by inoculation of rabbits that dried sputum after the lapse of three years was capable of inducing tuberculosis.

With this array of negative results a most conclusive proof is given that a body of consumptives need not infect the houses they occupy when their excretions are destroyed. To attain this end it requires that each new patient should be carefully instructed concerning the disposal of his sputum, and close supervision of them all be maintained.

Then each patient feels that he endangers himself as well as the others by not obeying the rules; if any one becomes careless in the matter it is quickly reported to the medical authority by one or more members of the sanitarium, every one appreciating fully the grave consequences of possibly infecting the cottages or public rooms.

The methods used are to burn all cuspidors daily, and the Japanese napkins as soon after using as possible; never to expectorate except into the large sanitary cuspidors when about the main buildings, or the small individual hand cuspidors. Paper napkins are used in the infirmary in hemorrhage cases or where patients are too feeble to get up on their elbows so as to spit into the cuspidor; these are used but once, then placed in a pasteboard receptacle and the whole thing burned several times a day. During the greater portion of the year fires are burning in every cottage, and the patients burn everything in the stove or fireplace.

---

[*] A. K. Stone: *American Journal of the Medical Sciences*, March, 1891.

In summer a barrel with some moist sawdust in the bottom is placed in an out-building, and the cuspidors and napkins are carried to this barrel, which is saturated with kerosene and burned three times a week. One-fourth of a square yard of dust from this building was inoculated into one guinea-pig, which remained healthy. A properly constructed crematory is much needed, but too costly at present to build. The cuspidors used are made by Seabury & Johnson, and of two sizes: one, the hand cuspidor, for individual use, and the other, a much larger size, for the piazzas and public rooms. The latter are placed in covered wooden boxes about four feet from the floor; these are easily taken down and cleansed. By this arrangement patients cannot spit at a cuspidor from a distance, and the mass of sputum is not blown over the edges of the cuspidor by the wind, as happened at first when uncovered cuspidors were placed upon the floors.

It is perhaps too much to suppose that all particles of infectious materials are thus destroyed; where seventy to eighty small hand cuspidors are in daily use there may be some slight soiling of a stand or the linen covers on which the cuspidors are placed; also in coughing some small masses of sputum may be violently expelled. These sources of contamination must be small, and are fraught with less danger by frequently washing the tin frames for the cuspidors and the cottage plan of housing patients, thereby avoiding the evils of overcrowding.

Besides the destruction of the sputum, other factors equally important have served as auxiliary means of keeping the cottages free from infection, not alone with tubercle bacilli, but also other germs: these are the construction of the cottages, which are built so as to insure thorough ventilation; the immense volume of air-space allotted to each patient—this is secured by large openings from the various bedrooms into the sitting-room, which communicates with the outside air by transoms opening above the piazza roofs; the smooth, hard-wood wainscoting, 7 to 8 feet high, around the whole cottage, permitting of thorough cleansing with soap and water; the absence of wall-papers, the upper walls and ceilings being heavily sized and then painted, rendering these also easily cleansed; the plain, simple furnishings —iron hospital beds, rugs, and hard-wood floors, and as few tapestries as possible; lastly, the large area of window surface, allowing the sun's rays and strong light free access to all parts of the cottage. Added clinical proof of the non-infectious character of the dust may be deduced from the fact that not one of the twenty to twenty-five attendants has ever developed tuberculosis; and also that no patient who was admitted suffering from pulmonary disease without the bacilli being present ever subsequently developed them.

How do these results compare with those of other experimenters?

Heron* inoculated one hundred guinea-pigs with dust taken from various sources in the City of London Hospital for Diseases of the Chest. In the greater number of experiments "a piece of dust was introduced into the sub-peritoneal tissue;" in some a solution of dust in sterilized water was injected into the pigs. Twenty-six pigs, twenty-six per cent., died of "either intense inflammation spreading from site of inoculation or septicæmia." Of the remaining seventy-four, two pigs (both inoculated with dust in solution), or 2.7 per cent., died of tuberculosis. The dust in each case came from "the tower of the hospital which acts as up-cast shaft," and was dark and unventilated. It would seem as though the implantation of a piece of dust was too small to place too great reliance on negative results.

---

* G. A. Heron: The Relation of Dust in Hospitals to Tuberculous Infection. *Lancet*, no. 3671, January 6, 1894.

Cornet* seven years ago gave us the following table;

PLACES.	Number of Animals Inoculated.	Of these Died of		Died of Infectious Diseases.		Remained Sound.
		Tuberculosis.	Other Infectious Diseases.	All Told.	In percentage to Inoculated Animals.	
In seven hospitals..	94	20	52	72	76.6	22
In three insane asylums.............	33	3	16	19	57.5	14
In two prisons.....	14	0	6	6	42	8
Inhalation rooms...	4	2	0	2	50	2
Dwellings of private tubercular patients..........	170	34	91	125	73.5	25
Polyclinic, orphan asylums, etc......	28	0	14	14	50	14
Surgical wards.....	8	0	1	1	12.5	7
Streets and hygiene institute....	41	0	16	16	39	25
Streets alone					55	
Thus of.......	392	59	196	2·5	65.5	137

In the hospitals 47.6 per cent. of the pigs not dying of acute infection developed tuberculosis; in private dwellings, 43.6 per cent.; in insane asylums, 17.6 per cent.

M. Kirchner† in examining the garrison lazaret of one of the army stations, experimented on forty-two pigs by inoculation with dust suspended in bouillon or implantation of dust-infected sponge in abdomen. Twenty-six, or 61.9 per cent., died from the operation and infection of wound. Sixteen, or 38.1 per cent., remained alive. One of the sixteen developed tuberculosis.

The writer secured the dust from a large city hospital out of the wards occupied by male and female tubercular patients. From male ward were inoculated three pigs with one-half square yard of dust. From female ward were inoculated three pigs with one-half square yard of dust. From female ward were again inoculated three pigs with little less than one-half square yard of dust. Of male ward pigs, one died; of female (first lot) all three died; of second lot one died of an intense cellular inflammation much resembling a malignant œdema. All these died on the first to third day after inoculation. The four living pigs were killed in sixty days, and one of those inoculated with dust from female ward had well advanced tuberculosis; thus, twenty-five per cent. of the pigs remaining alive developed tuberculosis, while 55.5 per cent. died of acute infection, some of which might have developed tuberculosis. In these wards the beds were carbolized once a week; the floors washed daily and scrubbed twice a week; the walls rekalsomined every six weeks, and Seabury & Johnson's cuspidors used, which were changed twice a day. In the female wards, however, long pieces of cheese-cloth were given to the sickest and weakest patients, which were used as a roll to spit into, and would last a patient from four to eight hours. This, in all probability, was the source of infection.

A close perusal of these results shows that the careful disinfection of the sputum has been productive of good results, but not yet fully satisfactory, since in each experiment the dust has been infected with tubercle bacilli. Of far more importance, however, is the fact that the dust was infected to such a virulent degree with other germs; to-day we know how much more serious are the cases of tuberculosis with mixed infection than are those of simple tuberculosis; that the latter may quickly be changed into the former when patients must live in an atmosphere laden with infectious germs is scarcely to be wondered at, inasmuch as, according to the above experimenters, three hundred and sixteen out of five hundred and forty-three inoculated pigs (or 58.1 per cent.) were killed by some form of infectious disease, the germs of which were contained in the dust.

Mixed infection is a most important factor in relation to a tubercular patient's condition, whether this arise from without by inhaling the germs of a heavily infected atmosphere, or is the result of an inflammatory process in the lungs. To it may be attributed the sudden and rapid changes for the worse in patients, who were doing well under proper climatic surroundings, after a sojourn of two to four weeks in a large city.

May not the condition of "hospitalism"

---

*Cornet: Loco citato.

†M. Kirchner: Einige Untersuchungen von Staub auf Tuberkelbacillen. *Zeitschrift f. Hyg. u. Inf. Krank*, Bd. 19, p. 153, 1895.

met with among the internes of the large hospital, and so frequently the precursor of tuberculosis, also be due to the same cause?

A few words concerning the best means of disinfecting sputum. Fire is unquestionably the very best disinfectant, but patented cuspidors are expensive; in place of these any cheap material, old pieces of linen, Japanese napkins, or even pieces of newspaper can be used. If such are made use of *they never should be used but once*, then, after being placed in some suitable receptacle, they, with the receptacle, should all be burned together. In a word, nothing into which a patient has expectorated should ever be handled again, and should not be allowed to dry. M. Kirchner[*] has shown, by inoculation-experiments, that sterilization for one-half hour is a thoroughly efficacious disinfectant.

Dry heat (100° C.), however, must be applied for several hours (Schill & Fisher).[†] The same experimenters give their conclusions concerning the disinfecting powers of various antiseptics as follows: Sublimate solutions cannot be considered suitable for disinfection of masses of tubercular sputum. Absolute alcohol gives indifferent results. Equal parts of a five per cent. carbolic acid solution and the amount of daily sputum will destroy with certainty the tubercle bacilli and spores in the sputum.

Delepine and Ransome[‡] have shown, by inoculation-experiments, that solutions of chlorinated lime, 1 to 10 and 1 to 100, will satisfactorily disinfect the walls of infected rooms, or bed-linen and clothing that has been infected.

It is to be hoped that formaline will prove an efficient disinfectant owing to its easy applicability and its non-corrosive action upon metals. The most powerful and at the same time freely obtainable agents are the sun's rays and diffused daylight. They can be used by everybody, and have been proven to be the most efficient disinfectant known.

It has been the writer's aim to enlighten the public mind concerning the freedom from danger of contact with tubercular patients, where the necessary sanitary precautions are taken to destroy all sputum. This is shown by the positive proof that, with the exception of one cottage where cause for infection was discovered, all the cottages, the infirmary and public sitting-rooms of a community of eighty tubercular patients were found free from tubercular infected dust.

Since Koch's discovery of the tubercle bacillus and the subsequent proof that it alone is the cause of the widespread contagion of tuberculosis, the enforced improved hygienic laws and the dissemination of the knowledge of successful preventive measures have been productive of good results, as shown by the mortality tables of various countries, viz.: in New York State the mortality in 1889 was 120 per 1000, whereas in 1894 it was only 108.46 per 1000.

Much more can and will be accomplished within the next few years by education of the public and preventive legal measures; along with our efforts, however, to prevent those who are tuberculous from infecting their fellowmen let us at the same time look out for their well-being and try to save the lives of many of them. How better can we accomplish this than by patterning after the sanitarium where sunlight, fresh air, good food, and out-of-door life, with separate cottages for each group of four or five patients, allow them the best chance of recovery?

On the question of comfort, on the question of pure air free from all germs of disease, on the question of economy, on the question of hygiene, and finally on the whole question of humanitarian principles, how much better off is the lingering consumptive in the open country or in the mountains than he who is cooped up within four walls of a city hospital with a measured cubic foot of air-space, spending his days and nights in an atmosphere artificially ventilated with air that is already contaminated.

---

[*] M. Kirchner: Ueber die Nothwendigkeit u. die beste Art des Sputums-desinfection bei Lungentuberculose. *Zeitschrift f. Hyg. u. Inf. Krank*, Leipzic, 1892, xii., 249.

[†] Schill and Fisher: Ueber die Desinfection des Auswurfes der Phthisiker. *Mittheilungen aus dem Kaiserlichen Gesundheitsamte*, Bd. ii., p. 133, 1884.

[‡] Delepine and Ransome: A Report on the Disinfection of Tubercle-infected Houses. *British Medical Journal*, no. 1781, p. 349, February 16, 1895.

DISCUSSION.

Dr. E. G. Janeway thought that while Dr. Hance had taken very little of our time to give us these facts, they were, nevertheless, very important and had involved a great deal of work. At a recent visit to the Sanitarium he had been impressed with its absolute cleanliness, the clear air about the cottages, their excellent ventilation, and the small number of inmates for the amount of air-space. In fact, he would much prefer to live in one of these cottages than at many hotels frequented by invalids. He felt that the chances of a patient sent there would be better than at most hotels. He often advised delicate people not to resort to hotels frequented by invalids, unless the proprietor was known to be extra careful regarding cleanliness, etc. We must not send our pulmonary invalids to places where they are liable to receive worse infection. Dr. Janeway said he knew from personal questioning of phthisical patients that there were many physicians in this city who did not warn their patients of the possibility of infecting others through the sputa and other excreta. If the precautions taken at the Adirondack Sanitarium were applied in this city we would have less tuberculosis. Yesterday, while riding in a street-car in Philadelphia, he observed a sign: "Passengers are positively prohibited from spitting in this car." This was a good warning, although it might not always be heeded.

Dr. Herman M. Biggs hoped the paper read would prove of great service to physicians and the Board of Health in combating tuberculosis in New York. It was exceedingly gratifying to learn that such precautions could be taken in a hospital for tuberculosis, which would effectually prevent danger of infection. The experiments narrated would seem to indicate that fact in the clearest way.

A few years ago, when the Board of Health contemplated classifying tuberculosis among the infectious diseases, a great outcry was made by the people and physicians that it would make these invalids a source of horror to their friends and cause them to be shunned as if they were lepers. The fact appeared to have been overlooked that, with proper precautions, they could be rendered absolutely innoxious to their associates. But where these precautions were not taken there was positive evidence of the greatest danger of spreading the infection. In one of our city hospitals as many as eleven nurses and orderlies, previously healthy, had been dismissed within a little more than two years, because suffering from tuberculosis. It was due to the fact that the hospital was overcrowded, had poor ventilation, and other conditions favorable for the transmission of the disease. Moreover, patients admitted with other diseases and remaining in such hospitals a few months often contracted tuberculosis.

The Health Department had found it the exception for physicians to instruct their patients with tuberculosis as to the danger of their sputa and the necessity for its safe disposal. This was nothing less than criminal negligence or indifference. One of the largest and best hospitals in the city lately handed the clothing and handerchiefs of a man dying in its wards of tuberculosis over to the wife without first disinfecting them, and this woman herself knew that it was wrong and boiled the clothes immediately. The people, it seemed, were being educated in advance of a part of the profession, for they followed precautions which they learned through the newspapers and without having been instructed by the family physician.

Dr. Biggs said it had been a hope of his for years that eventually a home for the treatment of the poor with tuberculosis would be established in the country. The paper showed that such a method of caring for these cases would be safe and practical.

Dr. H. P. Loomis said that ten years ago phthisis was not thought of as an infectious disease, and he believed it was about five years ago that the pathologists of the Board of Health were asked whether tuberculosis should be regarded as a source of infection. To-day the laity understood perfectly that it was. They were talking about the dust in their rooms, and he believed that more of them recognized this source of danger than we supposed. It was a satisfaction to know that there was a place where we could go and get absolutely harmless air, even if it did necessitate a sojourn at a consumptive sanitarium. He had paid many visits to Saranac Lake, and remembered well that in the beginning the project of establishing such a sanitarium met with much opposition, one objection which was suggested being that to bring together so many patients with a lingering disease would have a depressing effect; also that after a time the furniture would become contaminated and prove dangerous. Dr. Trudeaux did not believe this, and the paper read by Dr. Hance showed that under the plan adopted, of separate buildings, cleanliness, and destruction of the sputum, the danger of infection was very slight.

Dr. Loomis thought there was no doubt but what the separate house plan, with cleanliness and proper disposal of the sputum, was best in the management of consumption. With one exception there was no general hospital in the city which would retain within its wards cases of tuberculosis, and he believed the Commissioners of Charities were about to exclude them from Bellevue. The position of the tuberculous patient was sad indeed, as he drifted about between the Scylla of an agonizing family without means and the Charybdis of a charity hospital with closed doors. In view of the safety secured against infection in the Adirondack Sanitarium, Dr. Loomis thought the hospitals in this city could have separate buildings or wards in which tuberculous patients could be treated without danger to other wards. He believed St. Luke's, in its new site, would provide for this want, and the example ought to be copied by other institutions.

Dr. Freudenthal said that at Montefiore Home the sputa was carefully destroyed and the ventilation was better than at Bellevue, yet cases of infection with tuberculosis did occur in nurses and inmates. This might be accounted for in part by the fact that absolute cleanliness of patients and clothing was hardly possible.

Tuberculous Heirlooms in Country Homes.

Dr. Andrew H. Smith hoped this paper and its warning would reach country practitioners and people, for a great many houses in the rural districts, along with their ancient tapestry and furniture, were hot-beds for the culture of tubercle bacilli. Unlike houses in the city, the contents were not subject to change, but were sometimes used by several generations. The result was that not infrequently one after another in the house died of tuberculosis, and it was wrongly attributed to heredity instead of infection. They should be taught to leave their windows open and to renovate the furniture. Regarding sleeping-cars, Dr. Smith said the sheets were cleansed, but the blankets were used probably year after year without disinfection, and he never felt like permitting a patient going toward Saranac Lake to take a night train.

Infection in Hotels.

Dr. A. Jacobi said he knew from personal observation of the negligence of a number of our hotels with regard to infectious diseases. He knew more particularly of cases where diphtheria had occurred at intervals in the same suite of rooms in hotels, due no doubt to want of disinfection, cleanliness, and change of tapestry, etc. Tuberculosis could be spread in the same way. He thought there was more danger in the better class of flats, where the stairs were carpeted but seldom cleaned, than in the lower tenements, where no carpets existed.

Dr. Charles A. Leale, said the sleeping-cars going north were not the only ones whose blankets might profitably be cleaner, as he had observed on a trip to Jacksonville. In Florida, too, he saw draperies and carpets in hotels so contaminated as almost to produce emesis in the healthy.

Dr. J. W. Brannan thought that since Dr. Hance had shown that it was possible to conduct a sanitarium on a clean principle, it ought to be exacted of all institutions in this country to show a like clean bill of health.

Dr. A. Rose said that in places in Europe visited by him three things were missing which we had here, namely, carpets, dark bedrooms, and a basement. It would be interesting to know how much less tuberculosis we would have if these three things did not exist.—*N. Y. Med. Rec.*

ON ANTISEPSIS OF THE GASTRO-INTESTINAL CANAL.

Bardet, long associated with the late Dujardin-Beaumetz in experimental therapeutics, has, in a recent communication to the Société de Thérapeutique,* combated the doctrines of that writer and of Bouchard relative to the benefits of medicinal antisepsis of the digestive tube.

Among the antiseptics most in use the most active have been set aside as being dangerous. Thus the salts of mercury, with the exception of calomel, have given place to substances less active, but at the same time less toxic, such as the aromatic compounds, the naphthols, etc.

As evidence of the efficacy of intestinal antisepsis, Bouchard and others refer to the deodorization of the stools in patients who had taken stated doses of bismuth salicylate, naphthol beta, and other remedies of the same class given to disinfect the alimentary canal; also to the lowering of the maximum of toxicity of the intestinal contents and the diminution of the toxicity of the urine. Bardet affirms that these are not sufficient proofs of intestinal antisepsis. The deodorization of the fecal matters is not necessarily an indication of antifermentative action, nor is the fetid odor of the fæces a sure sign of the existence of putrid fermentation being almost peculiar to biliary retention. The deodorization of the fæces is quite relative, and due simply to the fact that the aromatic substances, themselves odorous, mask the odor of the fæces. The proof of this is that the aromatic compounds are powerless to attenuate the special odor of fecal matters which have undergone the putrid fermentation, and that, moreover, this deodorization cannot be obtained by powerful antiseptics not of the aromatic series, such as the salts of mercury.

Backiewicz says that he has observed a very notable diminution of the micro-organisms of the intestine as a result of intestinal antisepsis; Bouchard has said the same thing. Bardet affirms that these researches do not agree with his own. The sowing on glass-plates or in test-tubes of fecal matters, previously much diluted, taken from four patients before and after the prolonged administration of doses of benzo-naphthol amounting to four grams a day, has always resulted in an equal number of microbian colonies in all the samples; certainly the sowing was as fruitful after as before the administration of the antiseptics.

The urinary toxicity cannot itself enable us to gauge with certainty the rôle of intestinal antisepsis, for this toxicity does not result from intestinal fermentations alone, but also from the waste of cells in all parts of the organism.

Bardet says that his observations and his experiments lead him to think that the local or general antisepsis of the gastro-intestinal tract by means of medicaments of the aromatic series (benzo-naphthol, naphthol, naphthalin, salol) is in reality impossible. These substances do not necessarily break up in the alimentary canal, but they may accumulate or be eliminated without undergoing any decomposition. Their diffusion through the intestinal tract may be very limited, and there are cases where their absorption is *nil*.

It is true that favorable results have been reported from intestinal antisepsis in typhoid fever. Dr. Bardet alludes to these facts, and says that their explanation may not yet be possible. It may be said, however, that we do not know all the circumstances that bring about restoration in any given case of typhoid fever, and it is quite possible to attribute amelioration to the wrong causes. Moreover, excellent clinicians, in private practice and in hospitals, have made rigorous trial of the antiseptic method of treatment in typhoid fever, and have been disappointed; the results have not been better than by other methods of treatment.

Bardet also affirms that gastro-intestinal antisepsis cannot yet be considered a matter of choice in the treatment of dyspepsias, and the value attributed thereto is rather a matter of theory than of actual scientific demonstration.

---

* *Bull. et mem. Soc. de Thér.*, November 27, 1895.

It is worthy of mention in this connection that Dr. P. Dignat, in a late number of the *Journal de Médecine de Paris*, in a timely article, writes of the dangers which may possibly accrue from the internal administration of antiseptic remedies. He describes in detail two cases in which the ingestion, respectively, of salol and guaiacol, in comparatively feeble doses, produced a series of untoward symptoms. After a careful observation and study, these symptoms could only be ascribed to the action of the remedies alluded to. He believes that antiseptic internal medication renders some service, but insists that the fact that such medication is apt to do more harm than good in many instances should not be lost sight of in modern therapeutics. Unprejudiced experience will lead most therapeutists, we believe, to regard this as a judicious sentiment.—*Bost. Med. and Surg. Jour.*

MILITARY HYGIENE.

THE *Journal of the American Medical Association* for December 21 publishes a lecture on this subject by Major Charles Smart, of the Army Medical School, Washington, of which the following is the substance: The duties of an army surgeon, says the author, are various; they require him to be a many-sided specialist. When a soldier becomes sick the army medical officer has to treat him as his attending physician; when accidents or injuries occur he has to be prepared for the emergency as an operative surgeon, but at all times he has to watch over the health and strength of the command as its sanitary or health officer. In this last respect his duties do not differ materially from those of the health commissioner of a municipality. The health officer of a city has to guard the community against the introduction of infectious diseases by a system of quarantine or of careful inspection. If any infectious disease such as small-pox, scarlet fever, measles, diphtheria, cholera, or yellow fever, should make its appearance in the city notwithstanding his precautions, he must endeavor to prevent its spread by isolation, disinfection, and other special means, meanwhile determining, if possible, its derivation and the measures to be adopted to prevent the occurrence of other cases from the same source. He has likewise to guard the city against any outbreak of disease from local insanitary conditions, or, in other words, to see that all nuisances are abated. He has to look after the wholesomeness of meat, milk, and vegetables, and the condition of various articles of food as to purity or adulteration. He has to keep guard over the water-supply, whether general from the city reservoir or local from wells or springs, and to provide for the satisfactory removal of offal, garbage, waste water, and night soil. Lastly, he is responsible for the accuracy of the vital statistics of the community. To enable him to perform these various duties he has the assistance of a staff of expert employees, including sanitary, police, and plumbing inspectors, bacteriologists, analysts, and statisticians.

The army medical officer, says the author, has similar responsibilities, but he has no such staff; he must be prepared to undertake by himself any or all of these duties as the occasion may require. Hence the necessity on his part of a more intimate knowledge of the methods of practical hygiene than is usually conveyed in the curriculum of a medical college.

It is only in recent years that the status of the army medical officer as a health officer has been officially recognized. It is true that in the early years of the Republic he was charged by the *Regulations* to do everything in his power to eradicate contagion; but this meant only contagion in the hospitals, the contagion of hospital gangrene and of the deadly typhus fever, and gave him no power over the general wellbeing of the troops. The *Regulations* of 1828 provided that when troops were in quarters the surgeon should from time to time inspect the rooms and kitchens, the quality and preparation of the food, and the location and condition of the vaults, and report defects and suggest improvements to the commanding officer, who was directed to take such action as seemed to him necessary and proper. The surgeons did this honestly and faithfully, inspecting and recommending until they became tired of making recommendations that were never carried into effect, for the commanding officers of those days seldom considered it needful or proper to take any action, but instead often regarded the medical officer as officious and meddlesome, and his report and recommendations as reflections on their administration. For many years the regulation was, therefore, a dead letter; but in progress of time the popularization of sanitary science became such that military commanders began to have a better appreciation of sanitary recommendations, and as a result we have now vastly improved conditions and lessened rates of sickness and mortality. At the present time most military officers are as interested in the sanitary condition of their men as the medical officers themselves are. The duties of the military health officer do not differ materially from those of the civilian officer; they are both based on the same principles.

Two diseases, says the author, which affected humanity from the earliest periods had much influence in stimulating a practical interest in preventive medicine. To leprosy, he says, we owe our present hospital system, and to the plague our system of quarantine and maritime sanitation, although it is to cholera and to yellow fever that we owe the improved methods of the present day. The registration of vital statistics and the institution of boards of health are also two most important agencies in the modern progress of practical hygiene, and in the United States many cities and a few of the States have excellent systems, but he says, taken as a whole, this country is far behind in the registration of vital statistics. This is not so, however, with the United States Army, for army medical officers report all cases of sickness as well as deaths, and it is this which gives so much value to the statistical reports of the surgeon-general.

The protection of the coast-line against the importation of cholera, yellow fever, small-pox, etc., says Dr. Smart, is also a subject on which there must be either a perfect co-operation among local authorities or a federal supervision, for an efficient quarantine at one seaport is of no value to a country if the disease effects a landing in consequence of the inefficiency of the service at another port. There are also many questions concerning protection from indigenous diseases, such as consumption, typhoid fever, etc., which are of interest to all the States. For these reasons, he says, most of the medical and sanitary men of this country are anxious to see a national board of health established. At present the Marine Hospital Service conducts the duties of maritime quarantine, but it does not fulfil the purposes of a federal board on questions of internal sanitation. Medical men and sanitarians are therefore as earnest, he says, at the present time as they were in 1871 in their efforts to secure national health legislation, and there seems some prospect that this country may soon have a central or federal sanitary bureau.

Dr. Smart states that he has given the foregoing sketch on hygiene and sanitation in order that we may be better able to appreciate the relations of military hygiene to public hygiene; for, he says, the army medical officer in time of peace has usually a civilian settlement attached to his station for which he must act as health officer, and in time of war the sanitary interests of large sections of the country may devolve upon him.—*N. Y. Med. Jour.*

DIETETICS.

DIETETICS, "the science of the systematic regulation of the diet for hygienic or therapeutic purposes" (Gould) is a subject which, it seems to us, has not received that consideration which it deserves. During the past decade there has been a great increase in our knowledge of the chemistry of food; the physiology of digestion in health and disease; the kind and the quantity of food necessary to meet the requirements of nutrition under varying circumstances. In the light of these facts we cannot but express surprise that such an obvious necessity as a dietary standard for hospitals, asylums, and public institutions should not have been generally recognized years ago. We venture to offer, as one explanation, this fact, namely: that there is a most lamentable ignorance of this subject by the great majority of physicians, from whose ranks are taken the superintendents of our public institutions. It is well known that in too many cases these positions have been given for political reasons rather than for fitness evidenced by previous training. In the majority of institutions the selection and preparation of food for their inmates is left to some subordinate, who, if possible, is more ignorant of the science of dietetics than his superior. We are convinced that students of medicine should not be considered competent to practice until they have a fair working knowledge of this subject.

The modern idea that good nursing is the great contributing factor to the successful treatment of disease is correct. The physician who is up to date in all these accessories to usual medical knowledge, who cannot only tell his patients how they should live, but, if necessary, show them in a practical manner how food should be prepared, will meet with the highest success. The old idea that the physician, before he has earned his stipend, must give some tangible proof of his competency by prescribing or leaving some medicine with his patient at every visit, is gradually becoming obsolete. We hope that we do not too lightly estimate the value of drugs; what we decry is the prevalent notion that drugs are the beginning, middle, and end in the treatment of disease. When we have become thoroughly saturated with the fact that under no circumstances can drugs take the place of food, we shall enter upon a new era in the practice of medicine. We do not mean to say that it is only of late years that any attention has been given to diet; we do say, however, that formerly the mention of diet to patients carried with it a suggestion of starvation. The wise physician will be he who gives more advice and less drugs, and who will cultivate a taste for proper food. These thoughts are brought to the surface in reading in the *American Journal of Insanity* for October, a paper by Dr. Chas. W. Pilgrim, Superintendent of Hudson River Hospital, Poughkeepsie, on "Dietary of New York State Hospitals." He states in his opening paragraph that "the Commission in Lunacy of the State of New York, in June, 1893, recognizing the necessity for a standard dietary for hospitals for the insane, requested Professor Austin Flint, the eminent physiologist, to prepare a table of the requirements of these patients, to be based upon the daily loss of material by the organism."

This paper will repay careful reading, since the facts which have been obtained and which have proved so valuable in the one case should have equal value in all institutions. He gives the following table of diet based upon the exact physiological requirements of each person to be provided for in hospitals for the insane :

Daily revised.	Daily ounces.		For 100 persons for 30 days.
12	12	Meat, with bone, including salted meat, fresh and salted fish and poultry total....	2,250 lbs.
12	16	Flour (may be in part substituted by corn-meal and macaroni)........	2,250 lbs.
12	8	Potatoes..........	2.250 lbs.
16	8	Milk..............	1.500 qts.
2	4	Eggs (2)...........	250 doz.
2	2	Sugar..............	375 lbs.
2	2	Butter............	375 lbs.
1	2	Cheese............	188 lbs.
1½	1½	Rice.............94	
1½	1½	Hominy........94	282 lbs.
1½	1½	Oatmeal........94	
1½	1½	Beans or peas (dried)..........	282 lbs.
1	1	Coffee............	156 lbs.
⅛	¼	Tea...............	24 lbs.

This diet was strictly followed in every hospital under State control for one year. Each superintendent sent his report with suggestions based upon his experience for the year. This material was carefully examined by Prof. Flint, with the result that a revised table was adopted. It will be seen that flour was reduced, potatoes and milk increased, eggs and cheese decreased, and so on. This revised table has been adhered to for two years, and experience proves it to answer the purpose admirably. What he states about flour is worth repeating. "One hundred pounds flour will make 136 pounds of good bread. Cornmeal may be substituted for flour, but to a limited extent, as it is less nutritious and often disturbs digestion. Macaroni may be substituted for flour, but only as an occasional luxury. Bread should be made every day, and what is left over should be used in cooking and not be served again. If bread is made during the night and the baking finished as early as 3 A.M., it may be served the same day. If to be served the next day, it should be baked as late as practicable in the afternoon or evening. If bread is simply warmed through in the oven immediately before serving, the moisture absorbed by the gluten is driven off, and the bread is much more palatable and digestible; but bread should never be dried in this way more than once." Fresh vegetables in season are freely recommended, permitting greater variety and change of diet. Onions are particularly recommended.

In all public and most private institutions the inmates soon learn what dishes to expect on certain days. This is a frequent cause of complaint among people who live in boarding-houses, and also among pupils at boarding-schools. This becomes at times almost intolerably monotonous. Dr. Pilgrim advocates the plan of Dr. MacDonald, of the Dorset Asylum, who has his "cook, at the beginning of the week give him a list of dinners which can be prepared from the stores; from this list he selects seven, then settles the day when each dinner shall be given." This introduces a factor which has a good effect upon the inmates. To know in advance just what dishes we are to have set before us robs the occasion not only of much of its pleasure, but has a tendency to promote indigestion. Experience tends to show that according to circumstances this table may be varied. For example, we most heartily agree with Dr. Pilgrim that for workers the supply of milk is too small. He very properly says that the "question of diet is in certain cases one of life or death; of speedy recovery or confirmed dementia."

In commenting upon the paper of Dr. Pilgrim I have submitted that which I believe is applicable to all institutions. Any person having had experience in their government will readily agree that this is a timely paper. His remarks on the disadvantages of serving food on cheap crockery or tin dishes in a large dining-room, seating several hundred patients, should be commended.

As an example of the very worst method ever devised for feeding inmates of any institution commend us to the poor-houses of England. As illustrated by one of the late London papers, we are shown a high and very solid table, having bowl-like depressions in its surface. Around this table are seen *standing* several old men who are taking food from these "feeding troughs," as they are characterized by this same paper. With all our negligent care for our poor, I doubt if we have anything similar to the repulsive service depicted in this institution.—*Pac. Med. Jour.*

EARLY RISING AND INSANITY.

THE great poets of the world have always sung in praise of sleep:

"—— sore labor's bath,
Balm of hurt minds."

They have always consistently opposed the habit of early rising, except in so far as they have depicted (writing by the light of the lamp) the glories of the morning and the suggestive promises of a beautiful sunrise. The Scriptures are also on the side of prolonging slumber:

"Yet a little sleep, a little slumber, a little folding of the hands to sleep," says Solomon.

But the habits of modern civilization and the traditions of family life have been steadily set against these poetical and scriptural ideals. In whatever else men differ, or in whatever other way they err, it is agreed that the habit of early rising is seemly, advantageous, and necessary.

The statement, therefore, by a prominent alienist and superintendent of a large insane asylum, that early rising promotes insanity comes with a terrible shock upon the serenity of established beliefs and long-cherished customs. Dr. Selden H. Talcott, of Middletown, N. Y., however, supplements this statement of his by arguments of no mean weight. He calls attention to the relative frequency with which farmers, their wives, daughters, and sons become insane. The cause of this has heretofore been thought to be their isolated lives, their hard work, and perhaps the excessive use of pie and potatoes; yet these have never seemed quite adequate explanations, when one considers the fact that the farmer has constantly fresh air, abundant exercise, no undue excitement or mental strain, and relatively little alcoholism and syphilis. So that Dr. Talcott's view is, at least, a helpful one in the way of explaining the psychopathic tendencies of the ordinary agriculturist. He states that the excessive early hours of rising, which are customary among the farmers, and which hours are imposed upon their sons and daughters and wives, prevent a sufficient amount of rest. Growing children, he thinks, in particular suffer from "the artificial cut-off" which is applied so rigidly to their lives.

The suggestion of Dr. Talcott is valuable from another point of view, because the particular cause of insanity to which he refers is one that can be so easily and comfortably combated. It is not like the enforced abstinence from alcohol, and tea, and tobacco, high thinking, and all the other ordinary comforts or luxuries of civilization. The diminution of insanity by staying in bed later mornings is a task to which all will address themselves with pleasure, and we believe that every farmer's boy will have a sense of particular kindness toward the physician who has discovered this new method for preventing possible mental disorders. We might readjust the well-known lines of Sir William Jones, for the benefit of the farmer, somewhat as follows:

" Eight hours to sleep, to soothing pleasures seven,
Nine to the farm allot, and all to heaven."

—*Med. Rec.*

LEGAL MEASURES FOR PREVENTING THE SPREAD OF OPHTHALMIA.

At the last meeting of the Medical Society of the State of New York a special committee was appointed to call the attention of nurses and midwives to the law regulating their duties in cases of purulent ophthalmia of infants, and to report to the proper authorities cases in which this law was violated. In a circular, the committee says that it is well known that this disease can nearly always be controlled when proper treatment is commenced promptly, and also that when this treatment is omitted too long, or sometimes even for a few hours, it is then too late to save the little patient from life-long blindness. The disease has therefore been considered worthy of special legislation, and the law which relates to nurses and midwives is a part of chapter 361 of the laws of 1892, and reads as follows :

" Being a midwife, nurse, or other person having the care of an infant within the age of two weeks, neglects or omits to report immediately to the health officer or to a legally qualified practitioner of medicine of the city, town, or place where such child is being cared for, the fact that one or both eyes of such infant are inflamed or reddened whenever such shall be the case, or who applies any remedy therefor without the advice, or except by the direction of such officer or physician," etc.

Any person may notify the district attorney of this fault on the part of a nurse, and it becomes his duty to bring her case before the grand jury and have her indicted, prosecuted, and convicted in the name of the State, doing this free of cost to the parents of the child or to any one else.

Attention is called to cases in which convictions have been obtained under this law. In New York City the Society for the Prevention of Cruelty to Children has taken upon itself the duty of prosecuting in instances of violation of the statute.

The committee calls attention to this law because it realizes that many nurses and midwives have either forgotten its importance or overlooked its existence. It is sincerely hoped, says the circular, there will be no necessity for notifying the authorities of its violation, but with increased care on the part of those having charge of infants the number of blind may be materially decreased.

Lucien Howe, M.D., Buffalo;
[Signed] Peter A. Callan, M.D., New York; } *Committee.*
William C. Wey, M.D., Elmira.

—*N. Y. Med. Jour.*

THE ETIOLOGY OF OZENA.

Abel (*Zeitschrift für Hygiene und Infectionskrankheiten*, Bd. 21, Heft 1) concludes an elaborate bacteriologic and literary study of the processes included under the term ozena, as follows:

1. The mucous membrane of the nose is subject to a peculiar disease which begins with the appearance of isolated, minute masses of viscid muco-pus that rapidly dry into crusts. The process may extend and come to involve large districts of the nasal mucosa.

2. The above appearances are accompanied with actual changes in the mucous membrane; whether hypertrophy is the first change in all cases cannot be said for certain, but the final result of the process is atrophy of the mucosa and hence the term rhinitis atrophicans.

3. In a series of these cases decomposition occurs in the crusts, which is recognized by the unpleasant odor. This odor is an inconstant and secondary symptom. The cases in which it occurs are spoken of as examples of rhinitis atrophicans fetida or ozena (vera or simplex).

4. The disease may spread to the nasopharynx—where it may also begin—to the accessory nasal cavities, the internal ear, the larynx, and the trachea. The first noticeable change is the appearance of small masses of mucoid secretion.

5. The disease is an infectious one. The proof of this is seen in the transplantation of the process from the nose to the larynx or trachea of the same patient; the disease may also appear in several members of the same family. Finally the disease was produced experimentally in one case.

6. The cause of ozena is the bacillus mucosus ozena, which is closely related to the pneumobacillus of Friedländer, but presents several important characteristics. This bacillus is found present in the mucus in every stage of the disease; it does not penetrate into the mucous membrane. Such bacilli are not found in the nose under other conditions. When the ozena heals the bacillus disappears.

7. In one case a pure culture was introduced into the healthy nose and the first stage of ozena was produced.

8. The atrophy of the mucous membrane that develops in the course of ozena may be explained as due to poisonous substances produced by the bacillus or as due in part, at any rate, to pressure of the crusts upon the mucous membrane, the epithelial lining of which undergoes metaplasia, changing from cylindrical to squamous.

9. The factor in many cases of rhinitis atrophicans is due to a fetid decomposition of the masses of secretion, but this decomposition is not due to the bacillus mucosus, but to the action of other microörganisms which invade the mucus secondarily. The variations of this secondary invasion will explain the absence of fetor in some of the cases.

The demonstration of the probable etiologic relation of the bacillus to the atrophic rhinitis may at times become important from a diagnostic standpoint. The therapy which must be directed to destroying the bacillus necessarily meets with many difficulties on account of the numerous inaccessible cavities and recesses in the nose, and then the mucus in which the bacilli are imbedded protect the latter to some extent.

The importance of careful prophylaxis in connection with the use of instruments and in order to prevent the spread of the disease from one member of the family to others is self-evident.—*Jour. Am. Med Ass n.*

THE ACTION OF VACCINIA SERUM.

Hlava and Houl have been investigating the immunizing and curative properties of vaccinia serum, with a view to substituting its subcutaneous injection for inoculation with animal lymph, which has the disadvantages of uncertainty in action, rapid loss of protective power, and occasional serious complications (*Wiener klinische Rundschau*, October 6 and 13, 1895). They employed three different methods of preparing the serum from calves: (A) The animals were inoculated with vaccinia, in four days the resulting pustules were pricked and the lymph collected, subsequently a second and third injection of stronger lymph were made, without causing any pustulation or rise of temperature; the serum was collected about a fortnight after the last injection. (B) Inoculation as in A, no lymph collected; first reinoculation caused a rise of temperature; second none, serum collected fifteen days after the latter (C) Serum, plasma, and blood—the latter two mixed with two per cent. sodium citrate—taken from the calf four days after inoculation. Experiments were made with all these upon calves, and then, no ill-effects having been observed, upon children. The serum was injected, and at the same time or subsequently the children were inoculated with vaccinia Serum B was found too weak to produce much effect, though the vaccine vesicles were not so well developed as if it had not been used; 3 to 10 c.c. of serum A prevented the development of vaccine vesicles in six children out of thirteen on whom it was tried; the injection of serum C to the extent of 0.6 to 1.0 c.c. per kilo of body weight entirely prevented the action of vaccine lymph inoculated four days later. (The experiments with blood and plasma are not yet published.) Experiments have not yet been tried in variola; if they succeed, Hlava and Houl claim to have prepared a serum which will replace inoculation with vaccine lymph. It is immaterial whether the serum contains an antitoxin or the "vaccinia germ"; if the latter is the case, the method approaches that of vaccination with an impoverished pure cultivation —*Brit Med Jour.*

COMPARATIVE VITALITY OF THE SEXES.

It is the common impression that men are not only less subject to illness but are longer lived than women. The life tables of insurance companies, however, show that the term of life of women is slightly longer than that of men. The difference in the mortality rates during the first few years of life is striking During the first year the mortality among males is decidedly greater than among females Although more boys are born than girls, the proportions are reduced to almost even terms at the end of the first year by the excessive male mortality. Even during the first four years the mortality among males exceeds that among females, notwithstanding the fact that there are practically no distinctions made in the management of the two sexes. Both are subject to the same conditions, are dressed virtually the same, and receive the same food. At about five years the comparative death-rate among girls begins to increase. This has been attributed to the fact that boys of this age are more in the open air. The mortality in both sexes diminishes from this time until the twelfth year, when it attains its lowest point. It then steadily rises, being larger in each successive year. Between the twelfth and sixteenth years the death-rate among girls increases more rapidly than among boys, but after the sixteenth year, for several years, the rate of increase is more rapid on the male side. The explanations that have been offered for these peculiarities are not wholly satisfactory; but one fact is clear, that during early years females possess a greater tenacity of life than do males.—*Maryland Med. Jour.*

Department of Physical Education.

WITH SPECIAL REGARD TO THE SYMMETRICAL DEVELOPMENT OF THE BODY.

Edited by J. CLARK SLAY, M.D.

(*NEW YORK.*)

WHO SHOULD TEACH PHYSICAL EDUCATION?

THE awakening spirit of interest shown by the profession in the subject of physical exercise for the prevention and treatment of disease has served to direct attention anew to the need for special teaching along these lines.

The average practitioner of medicine occupies himself for the most part with the treatment of disease from its objective or outward manifestations, and no matter how much he may wish to fortify his patient against the inroads of disease by physical treatment, he but too often realizes that circumstances are against him, and abandons the unequal struggle. His more fortunately located brother, recognizing the fact that the subject is one that requires special study, turns those patients of his needing this treatment over to the care of the specialist. Exceptions are of course to be met with among physicians having a distinctly family practice, which gives them opportunities of studying and directing the growth of the individual from childhood up. But even here much remains to be desired, for we all know how insignificant a part the study of physical education plays in the curricula of the medical colleges of our country.

The need for a more systematic course of study has been long recognized, but in only a few of the leading university schools has any effort been made to supply this deficiency in their teaching. The leaders of thought in the medical profession are well aware of this, and we are beginning to hear more of the benefits derived from this treatment in the prevention and cure of disease than heretofore. But, as we have said, systematic study of the subject is practically unknown in the schools of medicine, and where physical treatment is indicated the attending physician is too often obliged either to neglect it altogether or turn his patient over to the manager of some gymnasium where physical training is supposed to be scientifically conducted. The danger attending the prescribing of physical exercise for the sick or debilitated by persons not fully versed in anatomy and in the physiological and pathological functions of the body need not be dwelt upon. Suffice it to say that lasting injury not infrequently results from the faulty methods of applying physical treatment by uneducated and inexperienced persons.

Exercises for the correction of faulty carriage, or for the development and strengthening of the body, otherwise healthy, may be prescribed by one who has intelligence enough to direct others. But in diseased or debilitated conditions the treatment cannot be entrusted to the ordinary teacher of gymnastics, no matter how expert he may be in exercises pertaining to the development of muscle groups. His limitations are always to be observed, and in complicated cases in which there is disease of some organ, such as the lungs, heart, stomach, liver, etc., the responsibility for treatment should be assumed by the qualified physician.

It is our purpose to give special attention in succeeding issues to methods for the diffusion of a wider knowledge of the treatment of functional derangements by exercise, and a number of contributions for this department are promised by some of the leading practitioners in this specialty.

THE PHYSICAL ELEMENT IN EDUCATION.

By Eugene L. Richards,
PROFESSOR OF MATHEMATICS IN YALE UNIVERSITY.

It would be as unwise as it is impossible to expect that every person engaged in education should be able to survey the whole field. Each educator takes a part, and is very apt to think that his or her part is the most important. Education, until quite recently, has been so widely regarded as brain culture that the whole trend of education is to develop the mind as one organ of the body, as if mind resided in the brain alone. And even those who know and admit that the mind is something more than brain disregard the fact in their systems of education, following almost unconsciously the old ruts. Thus Bain says in one place: "The organ of mind is not the brain by itself; it is the brain, nerves, muscles, organs of sense, and viscera." And yet, in "Education as a Science," he says: "Now, when we inquire into the meaning of physical education, we find it to be the rearing of a healthy human being by all the arts and devices of nursing, feeding, clothing, and general regimen. Mill includes this subject in his article, and Mr. Herbert Spencer devotes a very interesting chapter to it in his work on 'Education.' It seems to me, however, that this department may be kept quite separate, important though it be. It does not at all depend upon the principles and considerations that the educator, properly so called, has in view in the carrying on of his work. The discussion of this subject does not in any way help us in educational matters, as most commonly understood, nor does it derive any illumination from being placed side by side with the arts of the recognized teacher." And we have seen a Committee of Ten of the "recognized" teachers of our own land blocking out the time of the secondary schools without a single word of reference to the important matter of physical education.

The Committee of Fifteen, which lately met at Cleveland, Ohio, in their voluminous report on Education, did devote one short paragraph to physical culture. But they did not seem to grasp the vital connection between the growth of the mind and the development of the body; for they remark that "systematic physical training has for its object rather the will training than recreation"; and again: "Systematic physical exercise has its sufficient reason in its aid to a graceful use of the limbs, its development of muscles that are left unused or rudimentary unless called forth by special training, and for the help it gives to the teacher in the way of school discipline." The report makes physical culture subsidiary to other kinds of education; not as it should be considered—a *fundamental* and *necessary* part of education.

I have therefore thought that a few remarks on the physical element in education would be timely.

It is a suggestive fact that the ratio, by weight, of the brain to the body of a newborn infant is one to ten, while the ratio of the brain to the body of the average European adult man is one to forty-six. Does not this fact at the very outset of life point the way to a correct education? The body needs development till it attains maturity, if it is to have its appropriate growth. The brain needs care rather than special culture while the body is developing rapidly. Its appropriate culture for the years of growth is to be found in its supervision, direction, and control of the body.

If I were asked what should be the prime essential result of a man's education, I should say power, vigor. And by that I mean that a rightly educated man should have force in himself, of which he is master. And I do not hesitate to say that any education, however well it stores the mind with ideas or fills it with knowledge, and yet fails to cultivate this force, is so far a failure. I would extend my remarks so as to include similar statements about the education of woman. Her power may be of a different kind, but power she needs for the battle of life just as much as man needs his force. And until we educate our men rightly, and our women also to be in this respect real helpmeets to men, we shall not have on this continent a race which is to remain. What Dr. Clark says, in the "Building of a Brain," may well be quoted here: "On this continent races have been born and lived and disappeared. Mounds at the West, vestiges in Florida, and traces elsewhere proclaim at least two extinct races. The causes of their disappearance are undiscovered. We only know they are gone. The Indian, whom our ancestors confronted, was losing his hold on the continent when the *Mayflower* anchored in Plymouth Bay, and is now also rapidly disappearing. It remains to be seen if the Anglo-Saxon race, which has ventured upon a continent that has proved the tomb of antecedent races, can be more fortunate than they in maintaining a permanent grasp upon this western world."

How shall we develop this power? Regarding the new-born child as a bundle of latent forces, how shall we draw out these forces so that they shall be active, and yet be directed and controlled by an enlightened will? Only general suggestions can be offered. The order of development is important. The earliest attention should necessarily be given to the physical powers. Nutrition is of the first importance. Next comes motion, the exercise of muscles, and through these a certain development of mind and will. And these phenomena of motion on the part of children are so common, and, when we wish them to be quiet, so exasperating to us, that we miss their great importance in development. How can children grow without continual motion? Consider how large a part of our physical economy is dependent on motion. We pour food into the stomach, but the stomach is a muscular organ and does a great part of its work through muscular motion. It is to a certain extent dependent for its tone on the vigor of the muscular system. After the food is converted into chyle and sent drop by drop into the blood and is then passed through the oxygenizing process in the lungs, what is it that pumps it along the arteries but another muscular organ, the heart? And how much help this flow of nutritious blood to the very extremities of the system, into every nook and cranny of every organ of the body, derives from the action of the voluntary muscular system, we can hardly estimate. But we know the life current is quickened by exercise and slackened by the cessation of exercise. There is another way in which we know the influence of the voluntary muscular system. When more exercise is taken, more food is required to repair the waste, and there is better circulation of the blood.

Again, consider the senses, those avenues of knowledge to the knowing mind. Take the eye. It is not only a combination of lenses with a retina behind them sensitive to impressions. The lenses are furnished with adjusting muscles. And the ball itself is fitted with other muscles to roll it in the socket and to direct it on objects which the will commands it to see. Then, too, there is the sense of touch, which, with sight, gives us knowledge of the outside world. How could it give us such complete information of our environment were it not supplemented by the muscles of the outstretched arm and the feeling hand? Our hearing is better because we have muscles to enable us to turn the head that we may listen. Smell and taste are more efficient because they are supplemented by muscles appropriate to their functions.

Then, if we take our social life, how large a part of it is dependent on speech! And speech itself would be impossible without the muscular power of taking and expelling breath and the movement of the muscles of the larynx. Without muscles the hand of the writer could not produce our books any more than the cunning hand of the artificer could work out the inventions of this inventive age. Knowledge, itself, then, is dependent on muscles and the power of muscles on motion.

It is, therefore, a wise provision of Nature which implants in children a desire for play. By their very instincts they seek motion, and the exercise and growth of their bodies through motion.

But does the good effect of exercise end in the body? Is that simply larger and stronger? The mind, too, has its share of good. In the first place, the brain and nervous system are supplied with blood and more of it. The repair of the waste is more completely made. This of itself is one great gain. But in all use of the voluntary muscles there is, as the term implies, a necessary putting forth of will. The mind is exercised while the body works. And this is especially true in all exercises which require skill, in which the mind has an object to gain through the skilful use of the body. This mental element comes in very early in a child's life—as, for instance, in learning to walk, to swim, or to write. All through the years of childhood it accompanies motions in games, most mind being required in those games which require most skill. So those gymnastic exercises which call for combinations of muscles in action, and need quickness and exactness, are more useful for the majority of children and men than those requiring the use of strength alone. For to attain success in games or exercises of skill not only quickness of body is needed, but an alertness of mind, and often, too, quickness of the senses of sight and hearing. This mental element in certain athletic games explains, in a measure, their fascination. They furnish an exercise not for the body alone, but for the whole man—every part of his being, including his mind, his social nature, and even his moral nature coming into play. This is particularly the case in games in which a number of players are involved, so that individual skill must be subordinated to the good of the whole body of players. The individual must repress and control self and observe law. Children have the same discipline in their play when they engage in games requiring the observance of rules.

This mental element in games assigns to them the first place in any rational system of physical culture. The grind of the gymnasium is so distasteful to the generality of people that gymnastic exercise, whether free or with apparatus, is only sought as a last resort. But gymnasium work can be made interesting by variety and by competitions. By being made also a preparatory training for athletic sports, gymnastic exercises can be given an interest and a power which they would fail to possess if taken only from a sense of duty.

The more complete the exercise is for the whole system, the more complete is this development of the mind through the body. Therefore all supervision of the exercise of children should be in the line of removing obstacles to the free exercise of every muscle of the body. Care should be used to guard against the compression of any part of the body by tight clothing. Badly fitting, uncomfortable shoes often make the movements of the feet and lower limbs a torture, affecting, unfortunately, the carriage of the whole person, and producing ungraceful habits of walking.

The connection between the body and mind is so close that the working of every (even the smallest) muscle of the body must leave some trace in the mind. The education of the mind through the body is defective to the extent of every unused muscle. We see this plainly, according to Dr. Luys, quoted by Dr. Faries in his paper read last April: "When a limb has lost its function there is atrophy of certain parts of the gray matter of the brain, due to defective action of the motor cells." So that muscular exercise, besides conducing to the strength of the body, is necessary to the storing of force in the brain and nervous system. But this is not all. The brain has a great deal of its development in consequence of directing and controlling the use of the body through the muscular system. The more extensive this use of the muscles, the more complete the education. Interfere with this education by directing the will too early in life to conscious cerebration by means of books, and you not only check the development of the brain, but you deprive it also of a growth more important than knowledge can give it, and one which no subsequent effort can supply.

In support of this theory of the growth of mind and true brain power during the period of immaturity through the muscular system, I quote from Dr. Ladd's work on "Psychology": "All our study hitherto has led us to emphasize greatly the influence upon mental development of the constitution and functions of the muscular system. The condition and action of the muscles stand in reciprocal relation to the senses and to the feelings which form the necessary effective accompaniment of the senses. Furthermore, the striated (or so-called voluntary) muscles are organs of the will. In the complicated sensory motor apparatus all the most primary foundations of the intellectual life are laid."

This quotation is right in line with the fact that the first development of will comes through exercise of the muscles; for the first development of will, like all succeeding development of will, consists in overcoming resistance; and the first resistance to be overcome is physical. The child with flabby muscles has generally a defective will power. Men of strong physique have strong will power. Of course this will power to be effective must be educated and directed like any other power. But its foundation is laid in bodily power.

Another confirmation of the necessary connection between strength of body and power of mind is to be found in the history of the dominant races. The Greeks afforded the finest types of body of their times or of any succeeding times. They showed also that their intellectual activity was as remarkable as their physical development. They have produced a literature that will never die. The Roman supremacy, which lasted longer than the Greek, was founded on physical prowess. It also has left a law and a literature which are imperishable. The northern races of Europe, overcoming the Roman arms by sheer physical force, and appropriating what was best in the Roman polity, became the masters of the world. From those races — one more virile than the rest — the Saxon (now become the Anglo-Saxon) is through its descendants almost master of the present world. Moreover, all those races which declined went down before races of stronger physical power. The corruption of the body by sloth and effeminate luxury was followed by a mental decline, just as softness and weakness of mind and will have always gone hand in hand with enervated, enfeebled bodies.

But I should be misunderstood if I leave the impression that muscular force is the only one to be considered. Even of the bodily forces, or of the agents which go to make these forces, it is only one, though one of the most important. Nutrition must be attended to. Without perfect nutrition the best muscular force is impossible. If nutrition is faulty, muscular exercise if long continued does harm rather than good. Next in importance to nutrition is a fresh supply of oxygen to make good, pure blood. Exercise should be taken in the open air, or at least in the purest air possible. The skin should not be neglected. In fact, all the laws of hygiene should be observed. Tests and measurements should be made of every person, to determine the best kind of exercise for that particular person. And these examinations ought to be made by a thoroughly educated physician. It will not do to trust such an important agent in education as physical culture to a man or woman who has only a smattering of knowledge.

Systems of exercise are not half as important as the person who exercises. Systems are only important in what they can do for that person. The systems studied apart from the individual may be perfect. Applied without judgment to particular individuals they may prove disastrous failures. The persons exercising must be studied first, last, and all the time; next, their environment; and then the kinds of exercise suited to their condition and needs. — *Popular Science Monthly.*

SCHOOL DESKS.*

By E. H. Bradford, M.D.,

BOSTON.

Some years ago a committee was appointed in Boston to look into the question of school desks, and it did most admirable work. Of this society Dr. Henry Williams and Dr. David Lincoln served on this committee. A few years ago Dr. C. L. Scudder made a very careful examination of the actual condition of the school seats in our public schools, and showed by means of photographs of different school-rooms that the children were seated not at all according to their height, but according to the seats that were in the possession of the school-teacher, without any rational method of seating.

---

* Read before the Boston Society for Medical Improvement, November 4, 1895.

The School Committee, however, found itself powerless to remedy the matter, and was able only to make suggestions as to the need of improvement. Dr. E. M. Hartwell has called to my attention the fact that the first impulse toward improvement in school desks and seats started from this county and largely from Massachusetts. At the Vienna Exhibition, Boston's school desks and school seats received a diploma and a great deal of attention. This stimulated several of the German investigators, and since then improvements have been made and several commissions have been appointed to investigate the subject.

It might be advisable to adopt the report of some of these commissions as a standard. We are met, however, with a practical difficulty in the fact that American ingenuity has invented a number of adjustable desks and chairs for the use of schools. In certain localities certain manufacturers would be able to influence school committees; the best desk would not be introduced, but the one the local school committee would be persuaded was the best. There is, therefore, need for some scientific statement of the principles that should govern the construction of school desks and school chairs. Such a matter should be looked up more thoroughly even than has been done in Germany and the results published. Coming from a body of experts, acting at the instigation of a scientific body—such as the Improvement Society—the report would command attention.

It is therefore proposed to memorialize the School Committee of Boston to the following effect :

" To the School Committee of Boston :

" All of your memorialists are citizens of Boston and members of the medical profession. Viewed from the medical standpoint school life in Boston being a sedentary pursuit followed during the fateful period of growth is necessarily unnatural and artificial at best. Failing the best hygienic and sanitary conditions attainable, in a crowded and still growing city, the school population may easily constitute a serious menace to the public health. The fact that city children are inevitably handicapped somewhat in the struggle for existence by their environment—in which the school constitutes a large and potent factor—emphasizes the need of unremitting care and activity to prevent enfeebling and deteriorating influences from overweighting them altogether. We gratefully recognize that the School Committee has evinced an interest in the physical welfare of the children under its charge by providing in some measure for their physical training; by co-operating with the Boston Board of Health in the inauguration of a system of daily medical inspection of the schools, in order to limit the spread of infectious diseases; and by measures to improve the character and distribution of school furniture.

" The special purpose of this memorial is to urge upon your honorable body the great importance of providing our public schools with properly constructed desks and chairs, and to request that you will take still further action to attain that end. It is our impression that nearly fifty years ago Boston was among the first, possibly the first city in America to provide individual pupils with a separate desk and separate chair. More recently your honorable body has manifested renewed interest in the matter of school seating. This is shown by the School Committee's appointment in 1892 of three physicians from among its members to serve as a Special Committee on the Seating of Pupils, and by the experimental introduction of adjustable desks and chairs into a new primary school at the instance of the special committee alluded to. The publication of Dr. C. L. Scudder's 'Investigation into One of the Etiological Factors in the Production of Lateral Curvature of the Spine—Reasons Why the Seating of School-Children Should Receive Very Careful Supervision'—or School Document, No. 9, 1892; the order of the School Committee directing the supervisors and the directors of physical training to aid and advise teachers in the seating of pupils, and to report their observations and suggestions in regard to seating to the School Committee; and the publication of Dr. Hartwell's studies of the seating question, Reports of the Director of Physicial Training*—all appear to be traceable to recommendations emanating from the same special committee.

"The European movement for the reform of school seating, which began some thirty years ago, was considerably more influenced in its earlier stages by the force of American example than has latterly been the case. Particularly in the Continent, physiologists, physicians, orthopedic surgeons, and oculists have taken a leading part in the investigation and discussion of the principles of seating, and their results and conclusions have been given practical effect by numerous govermental commissions composed of medical and mechanical experts. The movement has led not only to a much higher development of the art of constructing adjustable school furniture than can be found among us, but also to other notable reforms, as, for instance, in the construction and lighting of school-rooms, the better printing of text-books, reformed methods of penmanship, and the medical inspection and supervision of schools.

"Several ingenious types of adjustable school desks have been put upon the American market by inventive makers within the past few years, and the number of such types is steadily increasing. Opinions in respect to the theoretical merit and the practical value of these new inventions appear to be confused and divided, and there is a good deal of hesitancy on the part of conservative school boards in adopting them for general use. To us this hesitancy seems natural and justifiable in view of the complex nature of the seating problem and the impossibility of solving it out of hand through the rough and ready methods of manufacturing enterprise. Unless and until American inventors and makers of would-be hygienic school desks and seats avail themselves of the lessons to be learned from the failures and successes of their European contemporaries, they are likely to lose time and money in roundabout and crude experiments, the cost of which will naturally be defrayed to some extent from the public purse.

"We respectfully submit that the physical welfare of our school-children, and the interests of our taxpayers and the exigencies of municipal economy would be best subserved in this matter if the deliberate and dispassionate opinion of a body of competent experts were secured and published as to the most important aspect of the school-seating question and as to the most approved and economical means of settling it.

"In view of the general agreement among those physicians and hygienists who have investigated the subject as to the bad eminence of faulty school furniture in producing spinal deformities, muscular weakness, nervous debility, and impaired vision among school-children; in view of the increasingly unsatisfactory nature of the school-seating question in this community, as well as in the country at large; in view of the fruitful results which have been attained by school-desk commissions in Europe; and in view of the measures hitherto taken by your honorable body in relation to this matter, we respectfully ask that you supplement those measures by appointing a committee of experts, who shall serve without pay, to report to the School Committee upon the principles of school seating together with such recommendations as they shall deem appropriate under the circumstances.

"In our judgment it is particularly desirable that such a committee should set forth the essential principles, both medical and mechanical, which are involved in the construction of school desks and chairs, and should make known the results of the most successful attempts to carry these principles into effect; since an authoritative exposition of principles for the guidance of all makers and buyers of school furniture is utterly lacking and very much needed among us at the present moment.

---

* See School Document No. 8, 1894, and School Document No. 4, 1893.

"The publication of such a report by such a committee as we ask for under the auspices of the Boston School Committee could not fail to attract wide attention and to exert a weighty influence upon physicians, school officials, and teachers throughout the country, which has been accustomed hitherto to look to Boston for aid in settling novel and knotty questions in the administration of educational affairs."—*Bost. Med. and Surg. Jour.*

MORPHINISM IN WOMEN.

DR. J. B. MATTISON, of Brooklyn: Morphinism in women is not rare, and the genesis of morphinism in women is not different from that in men. It is not an innate propensity to do wrong that causes morphinism—the great original cause is pain. The diagnosis in women need not be difficult. It is not true that all morphinists present a set of symptoms which make the diagnosis easy. Some morphinists use the drug for years with little departure from health of mind and body This view has led to legal error, and the most notable in recent years was in the case of Carlyle Harris. You will remember that application for a new trial was made on the ground that his wife had been a morphinist. The application was denied, and the presiding judge laid great stress upon his belief that, had she been an habitué, it would have been known to her husband. I have known again and again morphinism in the wife concealed from the husband for years. In view of this fact, I have no hesitation in saying that this opinion of Recorder Smyth was a grave judicial error.

We have infallible means of deciding morphinism in women. Two tests place the diagnosis beyond doubt—one is urinary analysis, and the other enforced abstinence. The latter is the better. Dr. E. H. Bartlett's process of urinary testing is simple and good. It consists in making the suspected urine alkaline with carbonate of sodium, and then adding a certain proportion of chloroform or amylic alcohol. The mixture is thoroughly shaken and allowed to settle. It is then drawn off and a small portion of lodic acid added. If morphine be present a violet tinge is seen in the liquid. Enforced abstinence from morphine for forty-eight hours will surely give rise to reflex symptoms due to need of morphia, and so settle the diagnosis.

I have had under my care patients who have taken morphine or opium for periods varying from six months to twenty-two years. In the latter case, in a woman, 14 oz. of laudanum were taken daily; she was not cured. One case under my care was that of a brilliant literary woman who took 40 grn. of morphine daily, subcutaneously.

Morphinism in women, as in men, is disastrous. The most imporant feature concerns the functions peculiar to their sex—ovulation and fecundation. The former is almost always disturbed, sometimes long suspended. On the removal of the cause it rights itself. Most women morphinists are sterile, although marked exceptions have been noted. The sterility of morphinism ends soon after cure of the disease. The prognosis in women eligible for treatment is good—even better than in men. The reason for this is that in medical men on recovery there is apt to be a premature return to professional work.

My most striking case of cure was a patient seen in 1884. She was the greatest wreck from morphine I ever saw—physically, too weak to walk; mentally, imbecile; there were various delusions of sight and sound, and, the only instance in a large experience, delusions of touch. Nevertheless, she responded promptly to treatment, and was dismissed cured in eleven weeks. She has remained well; tidings, by telegram, to that effect reaching me to-day.

The patient, as well as her disease, must be treated. The treatment must usually be longer in women than in men. Not seldom opium plays the minor part, a profound neurasthenia or other condition being of larger import. Under no condition, save in very limited opium-taking, should the drug be abruptly stopped. The abrupt removal of morphine is a method to be unqualifiedly condemned. It always causes intense suffering, often collapse, sometimes death.

I am profoundly impressed with the belief that the largest measure of good work by the medical profession in connection with morphinism lies, not in cure, but in prevention. In many cases morphine is needed to relieve pain, but in many more cases it need not be given. I believe the profession is increasingly appreciative of the danger of this snareful drug, and hence I am optimistic regarding morphinism in America.

Dr. L. F. Bishop: I have had occasion two or three times to treat melancholia by means of opium, and each time I have felt that there was danger in this treatment. I am aware that many authorities believe that there is little such danger, and, as the treatment is extremely useful in melancholia, I should like to know whether any of the author's cases arose in this manner.

Dr. H. N. Vineberg: I think I can safely say that I have never given a dose of morphine for dysmenorrhea—a most dangerous class of cases in which to give this drug. I have had excellent results in these cases from a combination of bromide of potassium, phenacetin, antifebrin, and viburnum. The cases that I have seen have been chiefly those in which there has been some mental depression, and the patients have kept up the drug. I should like to hear further regarding the method of treating these morphinists.

Dr. H. L. Collyer: Unfortunately, it is a custom among many physicians to place the hypodermic syringe in the hands of patients suffering from frequent attacks of rheumatism, dysmenorrhea, and other painful diseases. This is certainly most culpable. It is the duty of the physician to avoid prescribing morphine wherever this is possible. Many patent medicines contain large quantities of morphine, and are frequent causes of the morphine habit. Codeine is preferable on this account, but it lacks the stimulating effect characteristic of morphine.

Dr. McLean: Some patients, I have found, will acquire the habit after two or three administrations of very moderate doses of morphine; others, again, may take it, if it is carefully given, for several weeks, and yet not become enslaved by the drug. I wish to emphasize the point made in the paper that certain cases, apparently beyond all hope, may be restored to perfect health. I think this is not generally understood, for I have known of a number of persons who have been allowed to drift into mad-houses in the belief that nothing could be done.

I have recently attended a patient who was taking 8 grn. of morphine a day for two years, and 4 grn. a day for about eight years before this. This patient was cured in ten or eleven weeks by the very gradual withdrawal of the drug, the morphine being reduced one-fiftieth of a grain at a time through collusion with the druggist. It is now over a year since the patient was cured.

Dr. Mattison: In the treatment of melancholia by opium there is less danger of contracting the morphine disease. I use the word "disease," because this is a disease, and not a habit. The explanation is that the psychical factor which obtains in all cases of morphine disease does not obtain to such an extent in the insane. I know of cases in which melancholia has been the starting-point of the morphine disease. Again, morphinism in babies is a fact, and certainly the psychical factor is absent in these little patients. Morphinism is possible under any condition. I do not believe the person lives who, under certain conditions, can stand up against the power of morphine. I say this advisedly. There is always hazard in using opium in all painful diseases, whether the pain be due to dysmenorrhea or to other causes.

We are better equipped than ever before, by new additions to our Pharmacopœia, to avoid the frequent use of morphine. In the great majority of cases of functional, non-inflammatory diseases that play such a large part in the production of morphinism, there can be no question about the anodyne power of codeine, and in the larger use of codeine is to be found the great factor which is to prevent the morphine disease. Its anodyne power is only about one-third that of morphine, but, if given in proper doses and sufficiently often, it has a marked influence in relieving pain. I think codeinism possible, although this has been denied. Codeine lacks that peculiar subtle psychical factor which morphine possesses, and which plays such an important part in the production of the morphine disease.—*Am. M.-S. Bul.*

PROHIBITION TOWNS AND DRUG-STORES.

The attempt to enforce laws tending to make men better than they are meets with many obstacles. Human nature is the same everywhere, and ingenuity seems to be clever enough to evade the most carefully framed law.

The better part of most small towns has the welfare of its community at heart, and with that idea efforts are used to make and keep the community pure and moral. The avenues for occupation and amusement in a large city are such that, while those inclined to dissipation and to indulge in it to their heart's content, in reality are often distracted by other diversions, often of a more ennobling or less harmful nature, and that occupation that thus diverts at the same time elevates. In a small community where nothing goes on at night, and where all efforts to amuse and divert the idle mind meet with the greatest obstacles, the natural tendency of men, young, old, and middle-aged, is to congregate at certain places, talk and eventually drink, and the drinker in a small place usually becomes a sot for the want of something better to do, while that same man in a city might become a useful and law-abiding citizen.

The towns and communities that have voted by a majority to have no saloons need not sit down and think that drinking has been stopped. Let any one notice the character of freight and luggage that is brought to one of these prohibition towns on a train from a larger place. Usually it is in the shape of bottles and demijohns consigned to the prominent citizens and drug-stores. Any stranger in these parts, especially on a Saturday night, will notice the large number of full demijohns arriving, and will also wonder at the numerous drug-stores, which seem to do a thriving business out of all proportion to the size of the place.

One town in Maryland with a population of about 800 has four drug-stores, and in another place on the Eastern Shore of Maryland the drug-stores do a thriving business. One great obstacle to the success of prohibition in these small places is, sad to say, the physicians, who unhesitatingly write for themselves and their friends and patients prescriptions for whiskey and other stimulants to the amount of a pint and a quart at a time, and if it were not for these drink prescriptions these drug-stores, which are nothing more than bar-rooms, would not be able to exist.

In one town several physicians have just been indicted for what is called illegal prescribing. It is a great temptation for physicians to give such prescriptions, and many are obliged to do it or lose a large *clientèle*, but it is a shame to prostitute a noble profession to the plane of assistant barkeeper. Nothing short of combination can prevent this. It is not, too, always easy to make a distinction. There might be times when it was important to have stimulants, and under that plea probably those indicted will contest any action brought against them. Many physicians may not believe in the cause of what is usually called temperance, and may laugh at that apparent delusion, prohibition, but they ought not to lend their aid in making drunkards of their fellow-townsmen and thus increasing disease and crime.

This question is an important one, and physicians who continue to use their profession as a means of helping on the liquor traffic should not only be indicted by grand juries and bear any just penalty which may be inflicted, but they should lose caste among their professional colleagues and their position in their representative societies.—*Md. Med. Jour.*

"KISSING THE BOOK."

It appears to be exceedingly difficult to make the minor judges obey the law. Over and over again in these columns we have had occasion to refer to the flagrant illegalities committed by magistrates, coroners, and county court judges in not merely refusing to allow witnesses the right to take the oath in the new form, but in brow-beating and bullying those who make that exceedingly reasonable claim. The last incident reported in the daily press is a particularly bad case. It is stated that at the Whitechapel County Court a few days ago a witness, who was himself Scotch, strongly objected to "kiss the Book," on the ground that it had been kissed by hundreds of people that morning, and that some of them had probably been suffering from disease. As our readers are aware, the witness has an absolute right by statute to take this ground, and he was entitled to take the oath without further discussion according to what was originally the Scottish form, that is, by holding up his right hand without kissing the Book at all. One would have supposed that the county court judge, who was Judge Bacon, would have known this very simple point of law, especially as the late Home Secretary, in consequence of numerous complaints, addressed an official circular to all judicial officers specially calling their attention to the act. It is reported, however, that what happened at Whitechapel was that the Scotch gentleman was first of all bullied by the usher, who told him "he must kiss the Book," and then reprimanded by the judge, who singularly enough told him he ought to have asked to have the Book opened, and finally compelled him to kiss it in that fashion, although the witness with perfect truth remarked that that "did not make it much better." We should really like to know what excuse is to be made for county court judges, and even judges of the High Court, who persist in this childish disregard of what is now a well-known matter of elementary practice; and we sincerely hope that some of our readers will absolutely refuse to kiss one of these dirty and infectious court Testaments, and will tell the judge to his face that he ought to know the Act of Parliament and to obey it.—*Brit. Med. Jour.*

THE ABOLITION OF THE CONTAMINATING SLATE.

War against the school slate and pencil has been declared. Following the example set by the New York City Board of Health, calling upon the school authorities to abolish the use of slates on the ground that they spread contagion, comes the adoption of a resolution by the Mount Vernon Board of Education to the same purpose, and providing for the use of pads of paper instead. The alleged reasons for this action, in addition to the objection to the slate from a sanitary point of view, is that paper is now cheap, pads now being sold which are suitable for school purposes for from 2 to 5 cents each. Public school and health authorities in many cities and towns now have the subject under discussion, and will probably likewise decree that the slate and slate-pencil must go. These hitherto useful articles will now be of value only to receive "spirit messages" from the other world through so-called mediums.

THE BICYCLE AND THE PROSTATE.

The bicycle is not only a luxury, in many cases it is a necessity. Bicycling, however, is still ranked as a form of athletic exercise, and as such it should be followed with a certain amount of caution by those who use it too much.

Dr. T. A. McLaughlin, of Washington, reports cases in the *Virginia Medical Monthly* showing that cycling may cause prostatic disease, principally on account of a badly made saddle, and especially when the rider assumes an improper position, and in addition to that is in a relaxed physical condition.

The principal danger, the writer thinks, is from badly fitting saddles. They should be wider, offering more support for the tuberosities of the ischium, and the peak in front should be much shorter with a properly fitting saddle, thus dangers of prostrate disease will be very little.—*Md. Med. Jour.*

THE ADULTERATION OF DRUGS.

Dr. Tucker, the director of the New York Health Board Laboratory, in an address delivered before the Brooklyn Institute, gives an alarming picture of the adulteration of the many drngs in common use and frequently dispensed without prescriptions. From 1891 to 1894, inclusive, 8305 samples were examined, and not one-half were of good quality. Among the drugs mentioned as of inferior quality were the bromides and iodides, and especially precipitated sulphur, which was found to be impure in three-quarters of the 248 samples tested. In the use of these drugs no positive reliance could be placed upon their possible effects, unless obtained from druggists of known good repute.—*Med. Times.*

WOMEN DRUNKARDS.

The Inspector of Retreats for Inebriate Women in England gives a more hopeful prospect for the reclamation of women drunkards than is usually accepted. In one of the largest institutions, receiving only habitual drunkards, those who have come to utter misery and degradation, it is shown that twenty-five per cent. of the inmates give evidence of permanent recovery. None are considered to have recovered who are known even to have touched stimulants. The system adopted embraces immediate and entire abstinence, regular habits, and constant employment. Experience confirms what has often been proved before, that no harm is done even in the worst cases by sudden and complete abstention. The period of stay is twelve months. The inspector very properly urges that admission (at present voluntary) should be made compulsory.—*Md. Med. Jour.*

THE CARSONM ETHOD—OXYGEN-ETHER ANÆSTHESIA.

That the advance of surgery as an exact science, during the last half century, has been much more rapid than that of general medicine is well-nigh universally conceded, and is due largely to the discovery of anæsthesia. This rapid progress has been made at the expense of many human lives, and in a majority of cases the fatal termination to an otherwise brilliant success has been due to the fact that the method of producing narcosis proved such a drain upon the endurance of the patient that insufficient vitality remained to withstand the shock of the operation. To overcome this stumbling-block should be and is the aim and desire of our leading surgeons.

A number of articles have recently appeared in some of our leading contemporaries calling attention to the discovery made by Mr. J. Preston Carson, an analytical chemist of this city, of the value of oxygen gas in combination with ether, and which seems to have already accomplished much in this direction. Hitherto the use of this gas has been almost wholly confined to the field of therapeutics, having been employed successfully in phthisis, pneumonia, diphtheria, and many other affections of the respiratory organs, in capillary and catarrhal bronchitis, croup, asthma, and pulmonary congestion, in fact wherever there is diminished surface for blood aëration, oxygen relieves the cyanosis. Marked beneficial results are recorded where oxygen has been used in Bright's disease, scarlet fever, chronic nephritis, asphyxia, cardiac weakness, etc., etc., but up to a recent date its use in surgery has been as an emergency agent.

Mr. Carson has been familiar with the properties of oxygen, and acquainted with its various therapeutic uses, and it occurred to him that this agent, used in connection with ether, would prove valuable in sustaining the patient, without interfering with the anæsthesia. He brought the matter to the attention of several of our prominent surgeons, and in the leading article of the New York *Medical Record* (October 12, 1895), a full description of the method, made by Mr. J. Preston Carson, an analytical chemist of this city, is given, together with reports of the number of cases in which the combination of pure oxygen with the vapor of ether not only facilitated the anæsthetization, but largely removed the disagreeable and dangerous effects of the anæsthetic, and served to keep the patient in a normal condition throughout the operation, the presence of oxygen keeping the blood thoroughly oxygenated, and thereby preventing cyanosis or any disarrangement of the heart's action during narcosis. The first test of the oxygen-ether anæsthesia was made at St. Luke's Hospital, New York, and this was quickly followed, not only by others there, but by surgeons in the Post-Graduate, Polyclinic, and New York Cancer Hospitals, in St. Elizabeth's, St. Mark's, the Woman's, Bellevue, the Flower (homœopathic), the Ruptured and Crippled, the New York, the Columbus, and others in this city. In private practice as well the oxygen-ether method has received the stamp of approval and endorsement of the most eminent surgeons. After a number of operations in which this method was used, and full diagnosis of the various patients given, Dr. F. H. Markoe, attending surgeon of Bellevue and St. Luke's hospitals, summarizes the results of his observations as follows: "1. An absence of the so-called stage of excitement. 2. No cyanosis nor respiratory disturbances during anæsthesia. 3. A tendency to regain consciousness more quickly when etherization is discontinued than after usual methods. 4. No nausea or vomiting subsequent to etherization. 5. The amount of ether consumed to be considerably less than formerly." (*Med. Record*, October 12, 1895.) In the same paper Dr. C. S. Cole, Instructor in Surgery New York Post-Graduate Hospital, likewise cites a number of cases in which he has used the oxygen-ether combination, and states: "The amount of gas (oxygen) used has probably averaged about a gallon a minute. For an adult the ether consumed is about six ounces an hour, and half this quantity for a child. In case of one child less than three ounces of ether was used for over an hour's etherization. (Case IX.) In case of one man less than seven ounces for an hour and a half's etherization. The longest time to produce complete anæsthesia in any of my own cases has been fifteen minutes; the shortest a little less than three minutes. The time of recovery from fifteen to fifty minutes. Salivation that necessitated the cleansing out of the pharynx has occurred in only one case. Vomiting has not been serious or troublesome in any case, and in a large majority not even nausea has attended etherization or recovery. The effect of reducing the flow of oxygen has been to increase the rapidity of the heart's action, and *vice versa*. The color has been uniformly excellent, and not in a single instance has any 'bluing' been observed. In cases where the temperature has been taken no change has been noted. The largest amount of ether used in any one case has been eight ounces; the smallest less than three ounces for an hour's narcosis. The intense thirst so often present after etherization has been greatly moderated in every instance, and the feeling of suffocation less marked. The atmosphere of the operating-room has remained almost free from the odor of ether."

The experiences with this method here given have been followed by expressions of such high commendation in other journals, that it would seem that oxygen is destined to play an important part in the most progressive branch of medicine. The method of administration is exceedingly simple, and as the element of danger has been removed the anæsthetic can be administered without fear of consequences. It has been found by actual test that no chemical change or combination takes place, but simply a mechanical admixture of the vapor of ether and oxygen, in the proportions of about

60 per centum of ether and 40 per centum of oxygen.

The difficulty of obtaining a pure oxygen gas, which is a prime essential, will possibly retard, for a time, the general adoption of the oxygen-ether method outside the large cities where a supply of compressed gas is unattainable, but this need not be the case, as practical and easily operated apparatus for the generation of pure oxygen from chlorate of potash and manganese dioxide is to be had at a very moderate cost.

It would seem that in view of facts already demonstrated, a surgeon entering upon an operation where an anæsthetic is to be used, without a proper supply of oxygen at hand, lays himself open to severe criticism.

BOOK REVIEWS.

THE ARENA FOR FEBRUARY.

The February *Arena* is probably the most attractive issue of this great reformative and progressive review that has yet appeared. In its 176 pages are found notable papers by Forbes Winslow, D.C.L., of the Royal College of Physicians of London, on "Madness as Portrayed by Shakespeare." "The Land of the Noonday Sun," by Justice Walter Clark, LL.D., of the Supreme Bench of North Carolina (profusely illustrated). "The Bond and the Dollar," by John Clark Ridpath, LL.D.; the second paper of a most notable series by America's most popular living historian. "Bryant, the Poet and Politician," by Frank B. Sanborn. "Personal Reminiscences of Whittier," by his friend, the Rev. Christopher Coffin Hussey (with full-page half-tone illustration of the old Whittier homestead and portrait of Mr. Hussey). "The Government and the Telegraph Monopoly," by Prof. Frank Parsons, of Boston University School of Law. "A Half Century of Progress," by Professor Mary Lowe Dickinson, President of the National Council of Women (with full-page half-tone portrait of Elizabeth Cady Stanton). "Scientific Theosophy," by Prof. Joseph Rodes Buchanan, M.D. "The Utopia of Sir Thomas More" (Part II.), by the editor of *The Arena;* in this issue Mr. Flower concludes his series of papers (so far as *The Arena* is concerned) on "The Century of Sir Thomas More." "Is Woman Embodied Obstruction?" by Helen Campbell. "A New System of State Warrants," by the Hon. Howard L. Weed, Member of the Legislature of the State of Washington. *The Arena's* two serials—"The Valley Path," by Will Allen Dromgoole, and "Between Two Worlds," by Mrs. Calvin Kryder Reifsnider—gain greatly in interest with each succeeding issue.

ETIDORHPA; OR, THE END OF EARTH. By Professor John Uri Lloyd, of Cincinnati. Royal 8vo, 362 pages, cloth, net, $2. Published by The Robert Clarke Company.

This wonderful book, which is the great literary success of the present day, was originally published by its author for his friends. This edition was exhausted at once, therefore our readers will be glad to know that a new edition has been issued which will be within the reach of every one who would be interested in this marvellous story. We urge every physician and scientist to obtain a copy of "Etidorpha," for their library will not be complete without it. It opens up more thought on science than any book printed for years.

FOOD-PRODUCTS OF THE WORLD. By Mary E. Green, M.D., Member of the Jury of Awards on Food-Products, World's Columbian Exposition. Edited and illustrated by Grace Green Bohn. 250 pages with full index. Published by The Hotel World, Chicago.

Every now and again there comes before the world a book that is fully comprehensive of its title. Dr. Green has solved the problem of putting into very attractive form all we can well remember about the common and unusual foods of man. This is not a cook-book; it is much more, and gives us a broad intelligence of the nutritive value of foods and their uses in a very great variety of conditions. This book should be read by every housekeeper and every physician and nurse.

THE SCIENCE OF NUTRITION. By Edward Atkinson, LL.D., Ph.D. 242 pages, with index. Published by Damrell & Upham, Boston.

Edward Atkinson has gained a wide reputation as the originator of the "Aladdin Oven." His book covers the subject of food values and their economic preparation, and is written in such plain language that any one can understand the subject-matter fully. We take pleasure in recommending this valuable addition to the science of dietetics.

THE
DIETETIC AND HYGIENIC GAZETTE
A MONTHLY JOURNAL OF PHYSIOLOGICAL MEDICINE

VOL. XII. NEW YORK, MARCH, 1896. NO. 3

THE VALUE OF MEATS AS FOODS.*

BY R. H. CHITTENDEN, PH.D.,
PROFESSOR OF PHYSIOLOGICAL CHEMISTRY IN YALE UNIVERSITY.

ANIMAL foods have always occupied a prominent place in the dietary of civilized people, and this has resulted, without doubt, mainly from the teachings of instinct. In the early history of mankind little thought was given to questions of dietetics, to food-values, or to the physiological relationships of the various available food-stuffs. Men, doubtless, ate and drank that which was most readily obtainable, paying little heed to anything beyond the dictates of the palate, provided the food consumed served to keep up the strength and activity of the body. Who shall say that such a method is wholly irrational, for is it not followed to a great extent in this nineteenth century of ours with all its wisdom and experience? The palate surely is worthy of some consideration, and its teachings are not to be passed lightly over. In the words of Sir William Roberts, "The palate is placed like a dietetic conscience at the entrance-gate of food, and its appointed function is to pass summary judgment on the wholesomeness or unwholesomeness of the articles presented to it. It acts under the influence of a natural instinct, which is rarely at fault. This instinct represents an immense accumulation of experience, partly acquired and partly inherited. It is, of course, not infallible, no instinct is, but so close and true are the sympathies of the palate with the stomach and the rest of the organism that its dictates are entitled to the utmost deference as those of the rightful authority in the choice of food. . . . Who shall venture to say, that in the evolution of the human animal from the short-lived, immoral, and stupid savage, with his diet of wild fruit, roots, raw flesh, and unfiltered water, to the status of civilized man, the promptings of the palate have not played an important and even indispensable part?"

Of course, there are misfit palates, palates whose judgments are not to be relied upon, and whose teachings are full of sophistry, but as a general rule the normal palate is an organ to be respected, and its dictates may be confidently subjected to the search-light of reason and intelligence. Believing this, we may well accept the almost universal use of animal foods as a good indication at least of their value in the human dietary, and we might, perhaps, urge this fact as evidence against the doctrine of vegetarianism. A mixed diet, with animal foods as a prominent admixture, has certainly satisfied the needs of mankind for many generations, and as we shall presently show is most closely in accord with reason and physiological laws. Physiologists who would urge the partial resemblance of our teeth to those of the herbivorous or vegetable-feeding apes as an argument in favor of vegetarianism for the human race seemingly overlook the fact that we are intelligent beings, endowed with reason and ability to cook and prepare food so that it shall meet the requirements of our digestive system, as well as satisfy our palates, and that it is as natural for man to supply his needs with a variety of well-cooked foods, both vegetable and animal, as for the monkey to limit himself to a narrow diet of nuts and fruits.

---

* A lecture delivered at Pratt Institute, Brooklyn, Jan. 9, 1896.

I am not sure but the character and extent of our dietary might serve as a partial measure of our intelligence. Were we like the beasts of the field we might perhaps be content to feed upon grass and roots. Man is by nature omnivorous, and his palate demands a judicious mixture of animal and vegetable foods. A narrow dietary with its monotonous uniformity is to my mind as unphysiological as it is unsatisfactory, and we may be very sure that the diversity of food—diversity in kind and in the mode of preparation—craved by the educated palate serves some useful end. From time immemorial gratification of the palate has been looked upon as a means of giving expression to one's feelings of joy and happiness, as well as a ready means of creating joy. And it is only the ascetic who, hoping to purchase future blessings by crucifying the flesh and by the sacrifice of all personal pleasures, has turned away from the comforts of a liberal and well-ordered dietary. Thanksgiving, Christmas, and the nation's birthday would, I am sure, be celebrated with far less fervor than they are to-day if the banquet-table spread upon these occasions was laden simply with the fruits of the earth, or confined to the flesh of the animals which roam upon its surface.

I would not have these remarks misinterpreted, nor construed as laudatory of *too* liberal eating, for that, as we all know, is attended with many dangers, and is surely unphysiological in the extreme. Like excesses of all kinds, gratification of the palate when carried to the point where it becomes an excess is dangerous in many ways. Its indulgence brutalizes the mind and degrades the body, but so long as there is due regard for Nature's laws there need be no violation of physiological precepts or moral principles. I do wish, however, to emphasize the significance of following the dictates of our palates in the choice of a liberal diet, and here again I would not be understood as implying by a liberal diet all the varied delicacies of the season obtainable in a metropolitan market, but a diet in which there is a judicious commingling of flesh, fowl, and vegetables, with such modifications from day to day as will add variety of material and of flavor. This can be had only with a mixed diet, in which there shall be full recognition of the merits of both animal and vegetable foods. In my judgment, vegetarianism has no place in the diet of civilized man, certainly not in the temperate zone, and, on the other hand, a purely animal diet is equally unphysiological, but in the judicious mingling of the two, as the palate dictates, physiological laws are best observed and the health of the body maintained with the least wear and tear of the vital machinery.

In the dawn of civilization, man had to rely solely upon his palate for a decision as to the wholesomeness of his food, but to-day, thanks to the advance in physiological knowledge, we are able to test and determine, first, what the actual needs of the body are, and secondly, how they can best be supplied. To-day, therefore, we have rational grounds for our beliefs, founded upon observation and experiment, and we are no longer wholly at the mercy of the palate. The latter, as I have stated, may be a very good guide to follow, but nineteenth-century science demands facts and figures; it is satisfied with nothing short of a definite answer to the why and the wherefore, and requires statistics of the most elaborate kind for the satisfaction of its natural inquisitiveness. In considering, therefore, the value of meats as foods we must give a few moments' thought to the general question of animal nutrition in order to fully realize the bearings of our subject.

Physiologically considered, the object of food is simply to supply the needs of the body. These needs are not constant but are more or less variable both in character and amount. Age, activity, mental or physical, climate, a diseased condition of the body, etc., all modify the body's needs, and hence no absolutely definite statement can be made as to the needs of the body that will apply in every case. Men may exist while physically inactive on a daily food-supply that would be wholly insufficient to keep them from starvation if they were put to hard labor. The system of a rapidly growing youth who is forming new tissue requires more nitrogenous matter than the system of a fully developed adult, whether he be physically active or inactive. Even an ordinary man, living an ordinary life, will vary somewhat from day to day in the amount of food he will require to keep up his body equilibrium. It is therefore a difficult, if not impossible, matter to express in a single set of figures the composition of a normal diet that will hold good under all conditions, or even under a limited number of conditions. Theoretically, a normal diet may be defined as one on which an average man neither gains nor loses in weight, the body maintaining vigorous health and a condition of nitrogenous equilibrium under its influence. But, as Foster well says, "to put down a single column of figures as '*the* normal diet' would be to affect a vain and delusive accuracy."

However much the so-called normal diet varies among individuals it is plain that the income must at least equal the output, if the body is to hold its own. In middle life, when the body has reached the limit of its growth, to have the output and income equal is all that is required; but in the growing and developing body it is equally plain that the income must be in excess of the output, otherwise the body will be stunted from lack of material to grow upon. A man of average weight, say 150 to 160 pounds, loses about 2–3 pounds of matter daily through the expired air and in other excretions. Of course a large proportion of this loss is water, but there is an average excretion of about 230 grams of carbon and at least 15 grams of nitrogen, the former mainly as carbonic acid, the latter principally as urea. These two substances are the main products resulting from the chemical decompositions continually going on in the body as long as life endures. The decomposition-products thus formed are not derived directly from the food taken in but from the breaking down of the tissues themselves, the latter continually undergoing regeneration from the food upon which the body feeds. The food must therefore be adapted to supply the needs of the tissues if the body is to thrive, and the character of the food needed can be judged somewhat from the character of the output as well as by examination of the tissues themselves.

The tissues of the body are especially characterized by the presence of proteid or albuminous matter and the 15–18 grams of nitrogen excreted daily come wholly from the breaking down of this form of living matter. As this nitrogen can come only from proteid matter, the tissues of the body being unable to utilize any form of nitrogenous matter other than proteid, it follows that the average man must have an income of 100–125 grams of some form of proteid food per day to keep up nitrogenous equilibrium; *i.e.*, to supply the requisite nitrogenous matter needed for the well-being of the body.

Of the 230 grams of carbon excreted daily by the average man, on the other hand, only a small proportion can come from the breaking down of proteid matter, if the latter is supplied only in such amount as to furnish the required nitrogen. This carbonic acid, therefore, must be derived in great part from the decomposition of non-nitrogenous material, such as fats or carbohydrates. This output of carbon is large, 230 grams of this substance being equal to over half a pound of carbon, such as charcoal. It is thus evident that the non-nitrogenous matter consumed in the body of the average man is far in excess of the nitrogenous matter, from which we can readily see that a so-called normal diet must contain a far larger proportion of non-nitrogenous foods than of proteid or nitrogenous food. We may tabulate the average daily income of a healthy man of 150 pounds weight as

700 grams of solid food
700 " " oxygen.
2000 " " water.
———
3400

The solid food should be made up approximately as follows:

120 grams of proteid matter.
100 " " fat.
450 " " carbohydrates.
30 " " salts.

The proteid food may be supplied by any form of albuminous matter, such as the white of egg, the casein of milk, the albuminous matter of muscle-tissue or meat, or by vegetable albuminous matter such as the gluten of flour, or the various forms of proteid found in the cereals and other like products. The fat may be of either vegetable or animal origin, while the carbohydrate may be furnished in the form of starch, sugars, or dextrins, although ordinarily it is consumed mostly as farinaceous matter of some kind, as the starch of wheat-bread, the starch of oatmeal, potato, rice, indian-meal, etc.

Among these various food-stuffs, the proteids stand out prominently as the essential food-stuffs; essential, in that without their presence life itself would be impossible. No matter how large the income of fats and carbohydrates, the absence of proteid foods soon leads to death from nitrogen starvation. Yet we live and breathe in an atmosphere rich in nitrogen; it is continually passing in and out of our lungs, but the body has no power to utilize this element in its gaseous form. Even when nitrogen is combined it is of no value for the sustenance of the body unless it exists in the form of proteid matter of some kind. Even gelatin, though closely related to albumin, is not able to entirely replace this peculiar form of nitrogenous matter. It will take the place of albumin up to a certain point, but if the proteid matter of the food is entirely replaced by gelatin the body dies of nitrogen starvation. Hence, the value of proteid food for the life and well-being of the body cannot be overestimated. The alimentary tract may be filled to repletion with non-nitrogenous foods of any or all kinds, but if proteid matter is wholly wanting nitrogen starvation will eventually result. By this is not meant a deprivation of proteid food extending over a day or two merely, for in such cases the body draws upon the supply stored up in its own tissues and contained in the circulating blood, but a deprivation continued sufficiently long to completely exhaust the supply stored up for emergencies.

Fats and carbohydrates, on the other hand, are more or less closely akin to each other, and may take one another's place to a certain degree if occasion requires, without danger to the system. They are by no means to be considered as identical, however, physiologically any more than chemically, yet evidence seems to indicate that while they undoubtedly play different parts in the economy under ordinary circumstances, and cannot be entirely substituted, one for the other, they may supplant each other, at least up to a certain point. But while we may live without fat on the one hand, or carbohydrate on the other if choice or necessity compels, it is quite different with proteid matter. This is absolutely essential for the life of the animal body and nothing will entirely take its place.

Among the various forms of proteid foods, meat, or the flesh of animals, *i.e.*, muscular tissue, has always occupied a prominent place, and has, moreover, been generally considered as *par excellence the* proteid food of civilized man. Its use has met with wide acceptance, even from very early times, not only because of its strengthening and stimulating qualities, but because of its flavor when cooked, thus satisfying the palate in a way that vegetable foods rarely do. Let us consider the matter, however, from a scientific standpoint, and determine, if possible, the real merits of meat as a food for the human race.

The muscular tissue of an ox, for example, or what we in other words call fresh beef, contains about 75 per cent. of water. The 25 per cent. of dry solid matter is composed mainly of proteids of various forms, but in addition there are present various crystalline bodies—nitrogenized extractives, so-called—that help give flavor to the meat and possibly exert some physiological action. Then, too, the tissue contains some fat, a trace of glycogen and sugar, as well as inorganic salts that increase its value as a nutrient. But it is the proteid matter of the tissue that gives to meat its character, and it is as a proteid food that we will now consider it. When lean beef is dried so as to be entirely free from water, and then completely freed from fat by extraction with ether, it contains, according to the latest analyses of Argutinsky:

Carbon	49.6	per cent.
Hydrogen	6.9	"
Nitrogen	15.3	"
Ash	5.2	"
Oxygen Sulphur	23.0	"

It is thus seen to have the typical composition of a proteid substance, and with the exception of the white of an egg constitutes the most concentrated form of proteid food available in nature, though no more so than the meat or muscle-tissue of other animals. Bearing in mind what has already been stated, that an average man doing a moderate amount of work needs 15–18 grams of proteid nitrogen daily in order to keep up body equilibrium, he will require say 117 grams of this dry proteid material for his daily wants, assuming that he takes no other form of proteid matter; an amount which is equivalent to 468 grams of fresh beef, or a little more than one pound avoirdupois.

Meat is not only a concentrated food, but it contains very little waste material. It is, furthermore, readily utilized by the system, being easily digestible, when properly cooked, and hence can be utilized without much wear and tear on the part of the system. These latter are important points, since they raise the question of availability. The mere fact that a given food-stuff has a certain composition containing, it may be, so much proteid matter or so much carbohydrate, with a large amount of potential energy, is not by itself a safe guide to its physiological value as a food-stuff. Thus, as Foster well says, "A chunk of cheese stands very high on, generally at the top of, a table of the nutritive value of articles of food drawn up on exclusively chemical principles, according to the units of energy present in a unit of the material; but it is very low down in a corresponding physiological table. And similarly a dish of old peas has a very different physiological function from a plate of fresh meat, even when both contain the same amount of nitrogen." The nutritive value of a diet, therefore, must be corrected more or less, as occasion demands, for its digestibility or lack of digestibility, according to the facts. Now, meat is not only a rich proteid-containing food, but it is highly digestible, and the system is able to avail itself to the full extent of its nutritive qualities. It is therefore an economical food, physiologically considered and under proper conditions, since it entails little labor on the part of the system and little loss of valuable food material. Under some conditions, however, it becomes the reverse of economical, as when it is taken in too large proportions, since under such circumstances it must be broken down and then eliminated from the body, thus throwing a large amount of uncalled-for labor upon the various excretory organs, as well as exposing the system to the possible accumulation of a row of effete nitrogenous products which may be dangerous to the health of the individual. It is, however, better that the system should be supplied with a moderate excess of nitrogenous food than to have the daily dietary deficient in this important food-stuff. Too thrifty management of the food-supply is uneconomical in the long run, and it is noticeable that estimates restricted to the lowest margin of safety usually have reference to the feeding of others rather than to the calculation of a man's own dietary. As a distinguished writer on dietetics has observed, "It may be doubted whether it is wise to reduce the diet to the minimum which the work requires. The certain evils of an accidental deficiency, or of a miscalculation, are so serious that the danger outweighs the possible inconvenience of a slight excess. It were an unthrifty thrift indeed which impelled vigor of mind and body to effect a pecuniary (or physiological) saving, for there is no investment so remunerative as high health. A man need not consider that he is wasteful when he spends money upon making his bill of fare palatable and provocative of indulgence to the extent of moderate superfluity. Pleasure and prudence here walk hand in hand."

For a man doing a moderate amount of work the estimate already given, viz., 117 grams of dry proteid material, containing 18 grams of nitrogen, is none too high for the daily ration. This is equivalent to approximately one-fourth of a pound of dry proteid, and to serve its full purpose this must be mixed with sufficient fat and carbohydrate to yield at least 3050 large calories of energy; the calorie being the heat-unit by which the heat and energy obtainable from foods is measured. The above standard is the one generally adopted in Europe, especially in Germany, and while not to be considered as necessarily strictly accurate, it represents in a general way the consensus of physiological opinion on the continent of Europe as to the average make-up of a so-called normal diet. In this country a somewhat more liberal standard has been advocated, especially by Prof. Atwater, on the ground that the people of the United States lead a more active life, and that the well-nourished people of the working classes here instinctively eat more and do more work than in Europe. He therefore suggests a standard containing 0.28 pound of dry protein and yielding 3500 large calories of energy as better adapted for a man at moderate muscular work. In any event, this somewhat more liberal diet is in harmony with the view that ample nourishment is needed for doing the most and the best work, and simply fortifies our position that the daily dietary of a man doing a moderate amount of work should contain at least a quarter of a pound of dry proteid; *i.e.*, 18 grams of nitrogen.

It is of course understood that there cannot be fixed rigidity of diet, since the human body is not a machine unvarying in structure and working, but one showing great diversity in detail, at least, with personal peculiarities of digestion and assimilation which must necessarily lead to variations in the amount and quality of the nutritive material used. The main point is to so adjust the diet to the demands of the body that there will be sufficient proteid material for the building and repair of the tissues, with enough carbohydrate and fat for the production of the requisite energy and heat. If there is an insufficient supply of food, or the nutrients are not in the proper proportions, the body will tend to be weak in structure and incapable of doing its full complement of work. With a large excess of food, on the other hand, the health of the body will be endangered.

Now, since proteid foods are the essential food-stuffs without which life is impossible, why may not the body be wholly nourished upon this material? Why be to the trouble of adding other articles of food to the varied animal and vegetable food-stuffs with which we are surrounded? Life and vigor may certainly be sustained by such a form of diet, but there would be a lack of that variety which is so essential for the continued well-being of the body. Aside from this objection, however, there is a physiological reason of the greatest moment and one which needs careful attention. To live for long upon a purely proteid diet would be exceedingly unphysiological and dangerous. To understand this we must contrast the chemical composition and heat-producing power of the three classes of food-stuffs.

We may take the following figures as expressing the average chemical composition of the three classes:

	C.	N.	H.	O.	S.
Proteids......	53.0	16.0	7.0	23.8	1.2
Fats...........	76.5	0	12.0	11.5	0
Carbohydrates.	43.0	0	6.3	50.7	0

The available energy of the several food-stuffs may be represented as follows:

1 gram of proteid......	4500	small	calories.
1 gram of fat...........	9500	"	"
1 gram of carbohydrate.	4000	"	"

As has already been stated, a diet for an average healthy man should contain about 18 grams of nitrogen, 230 grams of carbon, and be capable of yielding an amount of energy equal to at least 3050 large calories. This amount of nitrogen would be furnished by say 120 grams of dry proteid, such as some form of meat, but this quantity of proteid would contain only a small fraction of the carbon required to supply the daily needs of the body. Thus, the 120 grams of proteid would furnish only 63.6 grams of carbon, or about one-fourth of the amount required. The available energy would amount to 540 large calories instead of 3000 large calories. Hence, on a purely proteid diet the amount of proteid matter must be increased to at least 5 times the quantity needed to supply the necessary nitrogen, otherwise there will be a great lack of carbon and of energy for the vital functions. Suppose, now, the proteid matter is increased so as to furnish 3000 large calories. This would involve the ingestion of 666 grams of dry proteid, but such an amount would contain 106 grams of nitrogen, or about six times the amount required by the body. This large surplus of nitrogen is of no use to the economy and must be gotten rid of. This entails a large amount of work — physiological labor — which involves considerable wear and tear of the vital machinery. But its removal from the body is imperative, for an accumulation of this nitrogenous matter in the form of the various bodies common to proteid metabolism would endanger the very life of the organism. As soon as proteid food reaches the alimentary tract it undergoes digestion through the co-operation of the gastric and pancreatic secretions. The products thus formed are absorbed mainly by the portal blood and carried directly to the liver, where they are subjected to a variety of influences, through the activity of the hepatic cells. Urea no doubt is formed here for one thing and is picked up by the circulating blood and hurried away to the kidneys, that its excretion or removal from the body may be accomplished as speedily as possible. Consequently, if the requisite amount of energy needed for the daily wants of the body is to be supplied by proteid food alone, there is a large, very large, excess of nitrogen-containing material to be gotten rid of, if the body is to be kept free from the baleful influence of the various nitrogenized substances formed in the decomposition of this proteid food.

How much more sensible, therefore, for the daily diet to be composed of a mixture of proteid with fats and carbohydrates. The two latter groups contain no nitrogen whatever, but they are rich, especially the fats, in carbon, and it would seem to be the special function of the fats and carbohydrates to furnish the greater portion of the energy for the body, while the proteids furnish that form of nitrogen which is so essential for the growth and repair of the tissues. A mixed diet, therefore, containing its due proportion of the three classes of food-stuffs with plenty of latitude for variations in the proportion of fats and carbohydrates, constitutes the best possible diet for mankind; indeed, it is the only form of diet possible if health and longevity are desired. To recapitulate, a certain amount of proteid food is absolutely necessary for the well-being of the body; to rely wholly upon proteid food, however, is unphysiological and dangerous for the reasons given; there must be an admixture of fats and carbohydrates if the energy needed by the body is to be supplied without increasing unduly the proteid foods.

Let us take the diet already referred to as representing the average daily needs of a healthy working-man and place opposite the figures the available energy derivable therefrom:

120 grams	proteid........	540	large calories.
100 "	fat............	950	" "
450 "	carbohydrates.	1800	" "
		3290	

Here we have a judicious commingling of the three classes of food-stuffs with enough proteid matter to supply the needs of the body, and yet avoiding an excess. The potential energy of the diet is contained mainly in the non-nitrogenous foods, which are, and should be, greatly in excess of the proteids.

(*To be continued in April number.*)

THE EVIL EFFECTS OF OVER-STUDY.

By W. Thornton Parker, M.D.,
Groveland, Mass.

The many influences provocative of heart disease are readily understood if we give the matter the least attention.

The nervous strain laid upon our young students is inexcusably wrong. Generally speaking they are too young to understand the full meaning of the condition which this youthful rush, miscalled energy, inflicts upon them. Later on in adult life, if they survive the terrible strain, they recognize the injury they have sustained when it is practically too late to undo the harm which has resulted.

The strain of study and the effort to acquire a high standing in the class is encouraged by the teachers and directors.

The tension of modern schooling must necessarily create nervous disorders, of which heart disease is one of the most easily recognized manifestations.

The trouble is present in the rudimentary errors of modern life, which we can see all about us, and which to the on-looker appear very much like morbid restlessness. The loads we place upon the shoulders of our children should shame us. We would never place physical loads in proportion to the mental burdens we force them to assume because if we did public justice would cry out against us. The physical burdens are not so injurious or far-reaching in harmful influence as the mental strain.

Our children go to school and labor mentally to please us, as well as to gratify their own ambition. We stand by and witness this outrage on our own flesh and blood without making any active effort to save them.

The Dietetic and Hygienic Gazette for December, 1895, quotes an excellent article from the *Boston Medical and Surgical Journal*, entitled "Too Much High Pressure at School," by Dr. Douglas Graham. He says:

"Most parents think that the studies of their sons and daughters at high school are altogether too numerous and too severe. We are apt to suppose that it is the particular high school to which our young people go that is at fault; but a little inquiry shows that our neighboring academies are just as bad, or even worse, in this respect. Who are to blame for this? Certainly not the parents. The teachers disclaim the responsibility, and many of them even regret it.

"Therefore in our municipality at least, we are forced to conclude that it must be either the supervisors or else that august body of irresponsible, tyrannical Solons called the *school committee*.

"We desire no worse punishment for such supervisors and committees than that they should be obliged to swallow the mental food which they have prescribed for the young people. This would give them a mental dyspepsia for the remainder of their days that would surely keep them from doing any more harm of this kind."

To quote from M. Dujardin-Beaumetz, "these students are badly developed, pale-blooded, exhibiting an excitability of the nervous system which results from excessive mental work, depriving them of sleep."

The prevalence of intractable cases of headache has been noticed by many physicians.

One of the most frequent causes of heart disease is the want of proper rest.

Insufficient sleep is one of the most noticeable evils of modern civilization. The nervous system, as well as the brain, suffers severely from this want of sleep. Both mind and body are seriously and oftentimes permanently injured.

Mental exhaustion, irritability, and brain-fag are the result, the sleeplessness causing neurasthenia.

So many of our students are ignorant concerning the requirements of health; or if not ignorant, are forced to continue their studies far into the night, reserving only four or five hours for sleep, when they should have at least eight or nine.

These hours of repose should be passed

in rooms where the best sanitary conditions obtain—and this is what almost never happens.

In the rush of student life, the meals are eaten with too much haste, the quality is apt to be poor, mastication improperly performed, and indigestion the invariable result.

Disease of the heart in young men acts as the exciting cause of melancholia. It is only within a day or two that we have read in one of our daily papers the sad suicide of a young man who had failed to pass his naval examinations on account of heart trouble, and finding the work at the Institute of Technology too severe, had become discouraged.

Indeed suicide among students during 1895 was horribly prevalent. A radical reform somewhere is urgently needed.

For all these injuries to our young men and women, a very grave responsibility rests upon the managers of our institutions of learning.

They desire to satisfy the public as to *their* faithfulness; the public demands that they shall exhibit a good showing for the large sums of money invested. And all this great burden rests at last upon the shoulders of our youths.

The manly vigor of the republic is robbed of its strength for the sake of creating an artificial condition which does not contain the elements of future national prosperity.

Nervous diseases, diseases of the digestive organs, diseases of the heart, consumption, insanity, and death are the result of the abominable overstrain which is so common in our institutions of learning to-day.

THE HYGIENIC PROTECTION OF SCHOOLS.

By Linnie C. Morse.
WESTFIELD, N. J.

One of the most important and timely questions of the present day is this: "What is most feasible for the protection of our schools from a condition of uncleanliness?" Rightly considered, it opens up a subject that is assuming a greater magnitude every day. Populations are constant in their increase, and with the increase there grows the danger of overcrowding and carelessness in regard to hygienic rules. Naturally, of necessity, one of the principal factors in uncleanliness is overcrowding, and so long as a fair degree of separation can be maintained, or a sufficient space allotted each individual, there is little if anything to be feared from the evils due to uncleanliness, the leading one of which is that of contagious disease.

With all of our boasted knowledge of the great laws of the government of life and health, and with all of our pet means and measures, we might still learn very much in the way of profitable lessons from that old Jewish code which although of a profoundly religious nature was but a set of splendid sanitary regulations. With all of our appliances of successful science, we might profit if we knew more of the system of ablutions and bathings that characterize the Brahminic civilization. But we pass by the Hebrew and the Hindoo, and what do we need from our own resources?

In the first place, a school is a community. Do not lose sight of that fact. The general and well-known principles that apply to communities apply to schools.

There should be a certain and definite floor space allowed to each pupil, and upon it there should be no trespassing. Do not "huddle" the scholars, as our grandmothers used to say. That is, do not "try to accommodate" pupils by packing into a room as many pupils as it can be made to hold. It is done where mistaken ideas of economy prevail. There are teachers who are always belying all of the laws of hygiene by "always having room for one more." So, with ignorance of the common laws of health, or at least with the grossest carelessness concerning them, the cleanly and uncleanly are brought together in immediate contact, and all the conditions are created to receive every evil that can arise from uncleanliness. There should be allowed for each pupil not less than fifteen square feet of floor space; and when the room has the number of pupils that this limit will permit, the door should be closed against all others; for with fifteen feet of floor space for each pupil, even that limit will not prevent the evils from uncleanliness. Measure up your school-rooms, and be very nearly satisfied if you find that the limit prevails.

In the second place there should be separate seats for each pupil. Two pupils should not sit together, for with the present system of classification according to studies a child with body and clothing in pure and cleanly condition is liable to contact with one in a filthy state. This contact is not merely a passing one, but one that circumstances enforce for several hours each day, and in rooms where there is a transgression of space and all the essential conditions for the propagation of those diseases that are begotten by uncleanliness and nourished by just such conditions. We have in recent years built our schools larger, and have substituted new and scientific desks and seats; but still we permit two to sit in a seat. If this is not retrogression, what is it? In the interests of health, of the proper care of the young, and of the strength of coming generations, it becomes a matter of obligation and duty to see to it that separate seats are provided and used in every school-house, and that two or perhaps three children are not crowded into the space that one should occupy. Believe it, as a good German scholar has said, "he who has a seatmate has a fool sitting by him."

In the third place, *ventilate*. Every school-room, class-room, and assembly-room should have an air-bath at least three or four times every day, and teachers should be required to attend to this personally. In order to an air-bath, every door and window ought to be thrown open to let the air have a thorough change, so as to carry off all foul matter. It is astonishing and in a manner incomprehensible that so many teachers are indifferent about this. They live day after day in rooms that do not have a free circulation of air, rooms with walls reeking with the foul matter thrown off from lungs, clothes, and bodies. In all reason and common sense, give the rooms "recesses" as well as the children.

A fourth rule is to wash the desks once a week, or at the very least once a month. This is another thing which we lose sight of altogether too frequently. Desks become filthy from the contact of moist hands and more or less soiled sleeves. The moisture soon forms a coating which the dusting-cloth and whisk-broom cannot remove, and which requires soap and water. If one has doubts as to this filth, let her use a little water on the surfaces, and examine the character of the water after the operation.

Fifthly, all pupils should be required to present themselves at school in a cleanly condition. "Wash your face and comb your hair before you come to school" is one of the good old rules that should still prevail. Cleanliness in person and neatness in attire should be expected of all, and a violation of this rule should cause the pupil to be sent home until the fault is remedied. Add to this, if you can, some salutary teaching as to the value of bathing. Encourage the boys to "go in swimming." It is true that teachers are liable to bring censure on themselves if they attempt to carry out such regulations, but she is a faithful teacher who can be found fault with.

In the sixth place beware of the drinking pail and cup. A covered pitcher should be provided for each class-room, and it should be filled with fresh water before each session. Each pupil should be provided with a numbered cup, and no interchange of cups should be permitted. The use of uncovered pitchers is dangerous to health, and the individual cup is as essential in the school as in the church. Epidemics of diphtheria have been due to the use of a common drinking-cup, and it should be strictly abolished.

Again, it should be incumbent on school boards to give every school-house a thorough cleaning immediately upon the occurrence of vacation, and a supplemental cleaning a day or two before the school is reopened. All too many school-houses are allowed to remain in their dirty condition and closed up all through the hot months of the summer vacation. The outhouses are left in the same lamentable condition. Small wonder that a "modern" teacher, on being told by a school-committeeman that "cleanliness is akin to godliness," inquired as to what god was referred to!

Finally, there is in all schools at the present day the rule that in case of a pupil known to have contagious disease, or coming from a family where such disease prevails, the privileges of attendance shall not be permitted. This is a good rule, and only needs to be insisted on.

Remember, then, these eight points—avoid overcrowding, have separate seats, thoroughly ventilate, wash the desks, insist on personal cleanliness, have individual drinking-cups, have a thorough house-cleaning, and enforce the contagious diseases rule. We cannot do too much for our children at school, and we cannot afford to be ignorant or careless.

THE MENTAL AND NERVOUS ELEMENT IN DISEASE.*

By T. S. Clouston, M.D., F.R.C.P.E.,

PHYSICIAN-SUPERINTENDENT, ROYAL ASYLUM, MORNINGSIDE, EDINBURGH, AND LECTURER ON MENTAL DISEASES, EDINBURGH UNIVERSITY.

To well-constituted minds it has a satisfying as well as a stimulating effect to "get hold of a principle." The modern study of medicine consists — necessarily consists, I fear, in its present stage—to so great an extent of the acquisition and storing up in the memory of vast numbers of isolated facts, that one of the greatest services any teacher can render to a student is to impress on his mind leading principles that shall henceforth become a part of his mental furniture, rails along which his mind will necessarily travel when problems have to be solved to which those principles are applicable. They thus become what a great law is to the physicist, both a suggestion and a test. The physician's principles suggest explanations of facts that appear to be unrelated, and enable him to apply tests to show whether facts that appear to be related are so in reality.

THE BRAIN CORTEX IN HEALTH AND DISEASE.

I would desire this evening to lay down and to enforce a principle that is, I think, not sufficiently, and often not at all, considered in practical medicine and surgery. It is founded on a physiological basis, and it is of the highest practical importance. The principle is that the brain cortex, and especially the mental cortex, has such a position in the economy that it has to be reckoned with more or less as a factor for good or evil in all diseases of every organ, in all operations, and in all injuries. Physiologically the cortex is the great regulator of all functions, the ever-active controller of every organ, and the ultimate court of appeal in every organic disturbance. We all know that every organ and every function are represented in the cortex, and are so represented that they all may be brought into the right relationship and harmony with each other, and so they all may be converted into a vital unity through it. Life and mind are the two factors of that organic unity that constitute a real animal organism. The mental cortex of man is the apex of the evolutionary pyramid, whose base is composed of the swarming myriads of bacilli and other monocellular germs which we now see to be almost all-pervading in nature. It seems as if it had

---

*Delivered before the Royal Medical Society, Edinburgh, Session 1895–96, and published in *The British Medical Journal.*

been the teleological aim of all evolution from the beginning. In it every other organ and function find their organic end. In histological structure—so far as we yet know this—it far exceeds all other organs in complexity. When we fully know the structure of each neuron, with its hundreds of fibres and its thousands of dendrites, and the relation of one neuron to another, when we can demonstrate the cortical apparatus for universal intercommunication of nervous energy, with its absolute solidarity, its partial localization, and its wondrous arrangements for mind, motion, sensibility, nutrition, repair, and drainage—when we fully know all this there will be no further question of the dominance of the brain cortex in the organic hierarchy, nor of its supreme importance in disease.

VAGUE SCIENTIFIC TERMINOLOGY.

If some people want to imply that a patient's symptoms are unimportant they call them "nervous"; if they want to ticket them as unworthy of consideration altogether they call them "mental"; and if they want to brand them as quite absurd, and out of the pale of human sympathy or medical effort, they call them "hysterical." One would imagine from those things that the phenomena of sensation, normal and abnormal, and those of consciousness, feeling, judging, willing, and memory, and their disturbances through cortical disease, were not comprehended in true scientific work at all, and that mind generally and nervous influence might be left out of account by the physician. A man breaks his leg, and it is said to be put up on "scientific principles." He loses his memory, his energy of will, his social instincts, and in the diagnosis and treatment of his disease the word "scientific" is exchanged for terms which are often vague and meaningless. The mental attitude of the physician is often changed somehow, when he is treating his patient's indigestion and constipation, as compared to that with which he considers and treats the mental pain that accompanied and perhaps caused the indigestion. The indigestion took its real origin, it may be, in a disturbance of the action of the mind and brain cortex, but the stomach only is thought of or treated by peptones, acids, or laxatives, and this is called "scientific" treatment. We do not need to hypnotize a patient to show that the mental centres in the cortex have the power of directly influencing physiological function and tissue nutrition.

THE INFLUENCE OF THE BRAIN CORTEX ON PHYSICAL ACTS.

We talk and laugh and weep, we blush and shiver, we hunger and sweat, we digest and defæcate all through the brain cortex. Not one of these physiological acts but can be instantly arrested by a mental act. Every one of them may through morbid cortical action become excessive or diseased. In mental disease, which means cortical disease, every one of these functions is commonly enough affected. The dry skin, the foul tongue, the constipation and malassimilation of certain melancholics, the greasy odorous perspiration, the phosphatic urine, and the constant flow of speech of many maniacal cases are every-day examples. All physicians now recognize that so-called hysterical paralysis, hysterical temperatures, hysterical anæsthesia and paræsthesia, and hysterical convulsions are from the cortex. The well-known cases of the doctor who loathed purgatives, suffered from constipation, but always could get a good motion in the morning by putting a dose of salts by his bedside at night; or the non-medical student who, thinking all pills were laxative, got a good purge from a lead and opium pill, show how the brain cortex in certain circumstances can affect the action of the bowels. It seems to be certain that the scientific medicine of the future will be able to utilize this power more extensively and so lessen the amount of purgatives and other physic prescribed. Surely a mental suggestion, an effort of the imagination, will be a more pleasant thing than a dose of castor-oil, and surely it will be quite as "scientific" treatment.

THE RÔLE OF THE BRAIN CORTEX IN HEALTH AND DISEASE.

The evidence that the brain cortex regulates absorption, secretion, vascular tone, and the anabolic and katabolic processes in the cells of the tissues may now be regarded as complete. Sores in many melancholic persons will not heal. The gland and the lung tissues in idiots and dements are unable to resist the attacks of the tubercle bacilli, so that two-thirds of our idiots and one-third of our worst dements die of tuberculous affections. Brown-Séquard showed that section of certain cutaneous nerves, thereby cutting off the cortical influences on the hair bulbs, will cause the hair to become white on these spots. When we have localized cortical destruction on one side of the brain we have, as we all know, resulting on the opposite side not only motor paralysis, but also wasted muscles, liability to bedsores, altered texture of the skin, and a lowered or heightened temperature.

The history of medicine is full of examples of emotional conditions causing and curing disease. Froude says that the Duke of Norfolk, when suspected by Queen Elizabeth of conspiracy, and anxious to clear himself in her presence, found his heart fail him, and "fell into an ague, and was fain to get him to bed without his dinner." Sir Samuel Baker says that any severe action of the mind, such as grief or anger, is almost certain to be succeeded by fever in certain parts of Africa. Rheumatism and gout are frequently caused by anger, fright, and depressed emotion. Shakespeare says ("Merchant of Venice"):

Why should a man, whose blood is warm within,
Sit like his grandsire cut in alabaster?
Sleep, when he wakes, and creep into the jaundice
By being peevish?

It seems, indeed, as if certain persons who are predisposed to special diseases have, as their great protective and prophylactic against them, a sound and well-working mind and brain cortex. When well in mind, they are sound in body. When disturbed in mind, they fall victims to their diathesis. I have no doubt myself that this is the strongest of all the forces from within that preserve health and protect from disease. It is now generally recognized that death takes place with most men, not because disease is overmastering, but because the resistive power against it at the time is lessened. A man gets over many attacks of bronchitis till he is over 70, and then his nervous resistance becomes too weak effectually to save his life. The degenerating cortex, as old age comes on, not only loses its faculties of memory and keen volition, but of trophic energy which it has hitherto supplied to the organs and tissues, so that we have atheroma, the senile heart, a shrivelled skin, and many other tissue degenerations. In reality a bad memory and an attack of senile eczema in a man of 75 may result from the same central nervous cause. For the healing as well as the prevention of disease, a sound cortex and a cheerful and buoyant mind are all-important.

MENTAL THERAPEUTICS

are, fortunately, had recourse to far more now than of old. The exhilarating and nutrition-stimulating effects on health of pleasant social intercourse, change of scene, of beautiful landscapes, of the summer sea shining in the sunshine, are now universally recognized. Bright and cheerful surroundings in our hospital wards are no unimportant part of the cure of their patients. The cures effected at our hydropathics and watering-places are surely mental in a large degree. What tonic and promoter of convalescence is equal to the "merry heart" which the wise man says heals like a medicine? If we fully accept and apply the sound principle that the brain cortex and mind constitute the great central resisting energy against the occurrence of disease and one of the great forces that make for its cure, we thus get an explanation of many facts that cannot be explained on any localizing theory. Such a conception prevents us from falling into that evil sort of surgical-mindedness which takes account only of the gross anatomy of the part affected and such things as can be seen and felt by the surgeon. It enlarges our conception of the human organism into something of that degree of complication which actually exists in nature. It affords an explanation of many of those miscalculations and disappointments which we only too frequently experience. It explains to some extent the extraordinary differences in the action of the same remedy in different persons, and in the same person under different conditions. You are probably aware what enormous doses of certain drugs an acutely maniacal or an excited melancholic patient will tolerate, and, indeed, will require for us to get the effect desired. The brain cortex, in a state of disturbance and disease, inhibits to a large extent the action of many drugs. I have given in old times a maniacal patient half an ounce of tincture of opium within a week after beginning to use the drug, and we frequently use paraldehyde in half-ounce doses before sleep can be obtained, while, in some cases, several drops of croton will not purge. In melancholia and some other forms of insanity we find intense sluggishness of the bowels, of the skin, and of the secretory glands that result entirely from the morbid cortical condition, which the usual laxatives, sudorifics, and cholagogues will not remedy. Nothing is more common than for the menstrual discharge to be diminished, arrested, or increased by mental and nervous influences. Any practitioner of physic who treats menstrual disturbances without reference to the patient's mental and general brain condition, will certainly not succeed fully in his efforts. The whole subject of the function of reproduction and sex is quite as much mental as bodily. It relates as much to the brain cortex and the mind as to the organs of sex and generation. A man who treats spermatorrhœa, masturbation, impotence, hysteria, and the allied affections without taking into account the affective and inhibitory state of his patient, and without using moral and mental means as well as physical agencies, is certainly acting on unphysiological lines.

A PROTEST AGAINST SURGICAL INTERFERENCE.

I cannot help adverting here to what I consider the rash and unjustifiable way the operations of castration and removing the ovaries and appendages were recently looked at, without any reference to their mental effects on the subjects of them. We know that there are two primary instincts in all the higher animal kingdom — to live and reproduce. No philosophic-minded gynæcologist can look lightly on the deliberate extinction, by surgical means, of the essential organs of reproduction. Profound mental changes commonly follow after this in young subjects. The difference between the mental qualities of an ox and a bull should be sufficiently evident even to the most surgical-minded gynæcologist. Yet I have seen the operation recommended with as little consideration of mental consequences as the opening of a whitlow. Depend upon it, gentlemen, it may be almost as great a crime to castrate as to kill.

All febrile conditions are strongly influenced by the mental and general cortical state of the patient. Some children will habitually become delirious at night at a temperature of 99°. The mental equilibrium of others will resist a temperature of 103° or 104°. This difference I attribute entirely to difference of quality of the brain cortex. The prognosis in many cases of fever largely depends on the mental state the patient was in when he took ill, or that in which he has remained during its course. The vasomotor and the special thermal cerebral centres in the cortex have the power of raising the body temperature, without any sepsis, by electrical or mechanical irritation. Claude Bernard long ago came to the conclusion that "fever ought to be regarded as a phenomenon purely nervous. We may, in short, produce all the disorders of the organic functions which mark its course by acting on the nervous system and upon it alone." I would point out that Bernard's expression "nervous" must be held to include the greatest of all the functions of the nervous centres, the mental, and it is in accordance with clinical fact that mind may, through the brain of course, set up or stay a fever. The temperature in acute mental conditions not uncommonly runs up to 103° or 104° without sepsis, from over-cortical action alone.

LAYCOCK'S WORK IN MENTAL PHYSIOLOGY.

No one can refer to the part the brain cortex plays in disease without referring to the epochal work in this department of the late Prof. Laycock, of our university. Gentlemen, you have many privileges and educational opportunities that we, your predecessors of forty years ago, did not enjoy. But all the advantages are not with you. We were examined less, I believe, but we speculated and theorized more. And our great master and exemplar in medical speculation and generalization was Laycock. He was a truly remarkable man, to whom modern neurology and medical psychology owe far more than they acknowledge. He was one of the pioneers of modern neurology before the term was coined. No man before or since has had so wide a grasp of the position and functions of the brain and its relations to mind, to development, to bodily function, and to pathological processes. I fear his work and his actual writings are largely forgotten in his old university, but his writings and teachings stimulated other men, who have since done great work. Hughlings Jackson and Ferrier were his students. It was he who suggested the infinite range and depth of brain function in organic life. He filled in the gap between Charles Bell and Marshall Hall and the modern British school of neurology. He first grasped the true brain significance of the hysterical and many of the nervous diseases of women. He first formulated the law of the reflex and automatic action of the higher brain in complicated motor and mental acts. He first detected and pointed out the direct action of the brain and of mind in causing certain trophic, vasomotor, glandular, and temperature changes. His work on "Mind and Brain; or, The Correlations of Consciousness," was a marvellous piece of labor and thought, to which every man, who has since then done any neurological and medico-psychological work, has been more or less indebted. He devised a nosological system of medicine of extraordinary ingenuity. He classified all fevers into groups, species, and genera on principles unthought of before. His mind was by far the most deductive I ever knew. He generalized and saw laws in regard to every series of phenomena he came across.

PHYSIOGNOMICAL DIAGNOSIS.

Every physician, and I think most surgeons of any experience, know the immense value in the diagnosis of disease or injury of what can be seen in the patient's face, or eye, or attitude, or movements. A wise and observant man often comes to most important and perfectly sound conclusions about the state of his patient's heart and lungs before ever he takes out his stethoscope. What is thus observed at least makes out a *primâ facie* case for special examination in certain directions. Some men have an instinct for correct physiognomical diagnosis, and all men ought no doubt to cultivate the observation of such facts. Our greatest physicians have almost all done so, and their power in this respect has conduced in large measure to their success. It is analogous to that wonderful faculty which the great leaders of mankind in all ages have possessed, that of reading their fellow-men's characters and estimating their capacities rapidly but surely from slight indications. Now, as Dr. Cuming truly said, our greatest physicians have also been mostly great men. Not that this faculty does not need to be supplemented and corrected by the facts of ordinary observation and minute "scientific" examination. Laycock was a great physiognomical diagnostician, and constantly preached its value to his students. I well remember a talk he gave me on the subject one quiet Sunday, when he and I were alone in his side room, in which he assured me that in time I should be able to diagnose half my cases at sight without further examination, if I gave proper attention to what he told me. I have seen him arrive at marvellous diagnoses thereby. Now, what are the foundations of all physiognomical diagnosis? There are two such foundations. One rests on the effect of local or general disease on the features, attitude, skin, and eye through the brain cortex. The muscles of the face are emphatically the mind muscles, and they often express in readable form to those who observe them acutely many most important and striking mental relationships of disease. The cortex is the key common to the normal expression of face and to the facial expression of disease.

Laycock says: "Study well the physiognomy of disease—that is to say, all those external characteristics in the patient that reach the unaided senses, and which are associated"—associated, I would point out, chiefly through the brain cortex—"with morbid states, whether they be sounds or odors or visible and tangible modifications of form, complexion, expression, and modes of functional activity, taking cognizance of minute modifications, as well as of the more obvious, for they are only minute in a popular sense." If this is done, it is as truly a "scientific" mode of diagnosis as any stethoscopic or chemical investigation. No doubt some persons are more tell-tale physiognomically than others, that is, there is in them a closer and more constant relationship between the organic and sensory centres in the cortex, and the mental and motor centres that control the face and attitudes; their mental reflexes are, in fact, more acute. Take as an example a case. A patient comes to you, and, before you ask him a question, you notice a peculiar glazy complexion, especially under the eyes, the eyes themselves showing a combination of brilliancy over the cornea, with pallor over the conjunctivæ, the skin of the face being rather muddy, the lips and ears a bit dusty, the breathing rather heavy, and the activity of the muscular movements diminished. These are signs of organic distress in the general mental expression of the countenance. If still further the patient has the typical outward signs of the arthritic diathesis, namely, tall figure, broad thorax, full abdomen, large muscles and frame, limbs large, movements rather sedate—and this observation of diathetic signs was one of Laycock's strong points, and forms the second basis of physiognomical diagnosis—then founding on all those outward phenomena, which by the experienced can be taken in at a glance, you form a valuable *primâ facie* case of renal-cardiac disease. Beyond any doubt, there may be a "gastric" or a "renal" look, and there may be a "cardiac" or "pulmonary" look in a man's face. It will be seen that almost all these outward signs arise through the brain cortex being acted on by the diseased organs, this action being reflected in the face.

RELATION OF NERVE-SUPPLY TO DISEASE.

Or to take a third example of a still more manifest kind. A woman with well-marked characters of the nervous diathesis, which is usually characterized by medium stature, small muscular development, spare habits, features marked and expressive, muscular movements in health abrupt and energetic, sensory power keen, reactive power to impressions from within and from without quick and intense. Your patient has the looks and the a-sexual shape of the climacteric on her. But she has a hopeless, fearful, depressed expression of eye, the skin is muddy, and the attitude and movements show a lack of nervous force. Before she has said six sentences you see that she suffers from climacteric melancholia, one of the innumerable neuroses that arise primarily out of the nervous diathesis, secondarily from the great epochs of life, and lastly from ordinary exciting causes of disease. Why does one man develop tertiary syphilitic disease of the nervous centres, or have locomotor ataxia, or Jacksonian epilepsy, or local paresis, or cerebral syphilomata, while nine-tenths of the other men who have tertiary syphilis develop its symptoms in the bones and joints and skin? Because he has a nervous diathesis or neurotic constitution, no doubt, which means that all causes of disease are attracted to his nervous tissues. His brain cortex is his weak point. When he becomes tired he is irritable, sleepless, and perhaps craves for alcoholic stimulants, which affect him strongly. When he has losses, misfortunes, or worries, they exhaust his nervous energy unduly and paralyze his volitional power, so that he is utterly cast down. When he marries he probably indulges in sexual intercourse to an inordinate and hurtful extent. When he is reduced by ordinary disease, he becomes sleepless, dyspeptic, nervous, or neurasthenic. When he is getting old, he fails in memory and in energy all at once. If predisposed specially to mental disease as well as being generally neurotic, any one of those reducing causes which I have mentioned may bring on an attack of melancholia or mania. When he has influenza, it attacks specially his brain cortex, and he is never the same man again. And, by the way, if one wanted a special illustration of the mental and nervous relation of an infective fever, one would select influenza. The microbe or its ptomaines have a special affinity, there can be no doubt, for the higher nervous centres. They eat up and destroy the nerve and mental energy. No mental and no nervous effort is possible while the disease lasts with most people; and the nerve cells, being the highest and most delicate in the organism, take by far the longest to recuperate. The simplest but most effectual mode of conserving and restoring nerve energy by going to bed at once, and staying there a long time, is never so necessary as in influenza. In some respects the influence of the brain cortex on existing diseases in any organ or tissue, and in warding off disease, is measured by the amount of its nerve-supply. A richly innervated tissue, like the skin of the finger pulps, is not nearly so liable to cutaneous eruptions as the less endowed skin of the back and limbs. And when we have in the same organ different tissues of different vitality and innervation, the higher and the more innervated tissue resists the effects of poisons far more effectually than the lower. Take, for example, the way in which the alcoholic or syphilitic poison affects the brain or the liver. They do not touch directly the nerve cells or fibres or the hepatic cells. They do all the pathological damage to the less innervated and less active connective tissue and vascular and lymphatic constituents of these organs. The neurine and hepatic tissues proper only suffer secondarily by pressure or irritation. It seems as if any tissue might effectually resist the assaults of its enemies if it had nerve influence enough from the brain cortex.

MENTAL THERAPEUTICS.

The nervous and mental element in disease is a universal and constant fact, but it prevails in different cases to a different extent. I could have related remarkable cases to you from my own experience, and out of the books, of functional disease being brought on and being cured by mental impressions only, of functions being suspended and altered from the same cause—nay, of actual organic lesions being directly caused and cured by mental impressions; as when blisters are caused by suggestion during hypnotic conditions. Constipation has been cured by doses of medicine containing no laxative, but with dogmatic assurances that a stool will follow in an hour. Warts have been "charmed" away; scurvy among sailors has been cured by the prospect of a naval fight; gouty swellings have disappeared when "Mad dog" or "Fire" was cried out suddenly to the sufferers. All these things have happened, but they occur only rarely, while some influence or other for good or evil is taking place, in some degree or way, from the patient's brain cortex and mind in every case of ordinary disease that you will have to treat. This is a fact that I am far more anxious to impress on you than to relate the marvels and the miracles of medicine. To keep in mind the ordinary laws of nature as they ordinarily manifest themselves in life and disease in their sure but commonly unconscious and quiet manner of acting, is of far more importance to each of us than to know the wonders and cataclysms that only occur once in a lifetime. The brain habit should be early formed in a physician to take account of, and instinctively and without conscious effort to apply the principle that the condition of the patient's brain cortex and mind can never be an equation to be left out of account in his treatment. Most people recognize that there are rare and striking effects of mind on body, few really realize its every-day effects. It is of far more consequence that our profession should remember the common than the uncommon in treating disease. If one desired to adduce one of the strongest illustrations of the influence of the cerebral cortex and mind on diseases, one would take the differences between day and night in nearly all disorders. We know that at night, and especially during sleep, the brain cortex is in a totally different state from its condition during the day, and the mind is then practically in abeyance. What is the result on function and disease? Do not all febrile affections become aggravated at night? Are not all mental affections then at their worst? Do not all pulmonary diseases then cause most pain and distress? Do not all the worst exacerbations of the neuroses of sensibility then occur? Do not the worst and most intractable of the convulsive disorders then come on? We can control the day fits of many epileptics wonderfully by the use of the bromides. We can seldom do any good to the night fits thereby. Is not asthma always worse at night? And is not night the time when the vital forces sink so low that mankind mostly die in the early hours of the morning? Gentlemen, many of you here present will, I fear, personally suffer much in fatigue and exhaustion of body and mind, and some of you even in life and limb, from this great law of the effect of the nocturnal depression of the brain cortex, for you will be called on to ride many a weary mile at night in darkness and danger to see patients who ought to have sent for you at midday, but who waited till midnight when the aggravation of their complaints came on. The night work of the doctor is largely due to many diseases being at their worst then; but in addition to this there is a mental state peculiar to the night both in the patient and in his relatives from the same cortical cause. Fears, depressed views of the result of the trouble, anticipations of evil, want of courageous common sense are then most manifest, and the doctor is hurriedly sent for, not, it may be, because the patient is much worse, but because he and his friends think so. This is a bit of practical psychology that touches us all in a very tender place, for who likes to turn out of a warm bed and be awakened out of a sound sleep to go out on a cold rainy night? What man's courage is as great at three in the morning as at midday? Nay what man's judgment is as clear then?

SHAKESPEARE'S KNOWLEDGE OF MENTAL PHENOMENA.

It is during the night that hallucinations as well as fears are most apt to appear. Shakespeare rightly places in the night Macbeth's dagger scene, and Lady Macbeth's false vision of the "damned spot" of blood that she so vainly tries to wash clean. During the day his crime in no way disturbs him. As night approaches—

Then comes my fit again: I had else been perfect:
Whole as the marble, founded as the rock;
As broad and general as the casing air;
But now, I'm cabin'd, cribbed, confined, bound in
To saucy doubts and fears.

By day—

I cannot taint with fear . . .
The mind I sway by, and the heart I bear
Shall never sag with doubt, nor shake with fear.

By night, the ghost of Banquo appears and Macbeth cries with terror—

Thou canst not say I did it; never shake
Thy gory locks at me,

though he tries to bring back his courage by vaunting, "What man dare I dare," but his cheeks are "blanched with fear." His hallucination was then intensely vivid—

Is this a dagger which I see before me?
. . . Come, let me clutch thee:
I have thee not and yet I see thee still.

He questions the truth of his sense impressions, and he reasons as to their apparent contradiction.

Art thou not, fatal vision, sensible
To feeling, as to sight? Or art thou but
A dagger of the mind, a false creation
Proceeding from the heat-oppressed brain?

And when the real knocking is heard, how his courage vanishes—

How is't with me when every noise appals me?

The picture is perfect of the mental differences between night and day, and comment would spoil it. Macbeth's fears and fancies cover the whole psychology of night. Every man is conscious of having within him the same lessened power of judgment, and lowered emotions at night as compared with day, and this lowered feeling means lowered resistive power against disease, and lessened recuperative energy.

If mind and brain so powerfully affect the conditions of disease, one naturally turns to them in looking for means of cure. And beyond all question we can often get effectual help there. Half the diseases that kill, as I have already said, do so because there is no sufficient power in the organism to resist them. The physiological commonly passes into the pathological, because the nerve energy is below par. To check many diseased conditions we cannot employ better therapeutics than to stimulate the cortex and strengthen the mental energy. To this end the first thing a good doctor does is to inspire confidence in his patient. What is this but a bit of psycho-therapeutics? And it is an all-important one in many cases. So to condition the patient that his brain and mind are kept up to the very highest mark attainable, to remove irritations (mental and nervous), and to distract attention from a lowering to a cheerful view of the whole situation, may make all the difference between life and death in many a case. Hope and a calm cheerfulness are often the best general aids to healthy metabolism. We know that a joyful emotion will at once fill the cortical capillaries. It is a true cerebral stimulant. Aided by medicinal cortical tonics and stimulants, like strychnine, quinine, the mineral acids, etc., mental stimulation is an undeniable adjuvant to the local treatment of disease, and is used largely by the most successful physicians.

To explain all those mental and nervous effects on nutrition, on function, and on disease, we must not forget that it is gradually being demonstrated, even in our present state of histological knowledge, that we have a sufficient apparatus in the brain cortex and its peripheral connections. Experimental physiologists and histologists can tell us much about the way the local centres are demonstrably connected with vasomotor, motor, and sensory action throughout the body, and that each centre has a direct connection with every other. It is not a vague question of "mind acting on body," of imagination producing physical effects. The highest mental centres can be demonstrated to have abundant and direct connections with the lower motor and trophic centres. All the centres can now be proved to have strands of fibres passing from the one to the other, and every centre can be proved to act on its organ, and to be reacted on in return.

Year by year the number of deaths returned as caused by nervous diseases is increasing. I believe that one effect of our modern universal education, universal newspaper reading, and the democratic spirit of self-government, will be to give the brain cortex more dominance in general diseases than in former ages. The nervous and mental element will have to be more and more considered in the future in his work by the physician and surgeon, in its prophylactic, etiological, and therapeutic aspects.

THE "SACRED BREATH CUBE" FOR FACTORIES.—VENTILATING FANS IN LAUNDRIES.

THE *Medical Press and Circular*, January 8, states that a new law as to factories went into operation in Great Britain at the beginning of the year 1896. The cubical air-space is, by the new act, moderately increased, but cannot be said to be extravagantly high, but from a general sanitary standpoint the *Press* concludes that "the new measure constitutes a considerable advance upon all previous enactments of a similar nature. First and foremost the great principle of the prevention of overcrowding in work-places has at length been formally recognized by the legislature of this country. The act provides that a factory or workshop shall be deemed overcrowded, so as to be injurious to the health of its inmates, if there be less than 250 cubic feet of space to each person during overtime. At the same time, there is an important rider to the effect that the secretary of state may modify this proportion for any period during which other than electric light is used, and may as regards any particular manufacturing process of handicraft substitute any higher cubical figures than those mentioned. The necessity for such a proviso in many trades—such as baking—will be at once evident to all who are familiar with industrial processes. Then we find that the powers of the administrative authorities are greatly increased. Thus, a court of summary jurisdiction, meaning in London a police court, may on complaint by an inspector, and on being satisfied that a factory or workshop is in a dangerous or insanitary condition, prohibit the place from being used until such works as are necessary to remove the danger have been executed. This provision will strengthen the hand of the factory inspector to an almost incalculable extent. Adequate penalties are provided for the employment of persons in places injurious to health, or for allowing wearing apparel to be made up, cleaned or repaired in places where there is scarlet fever or small-pox. The last clause is so directly practical, so obvious, and so elementary as a common-sense first step in prevention of the spread of infectious disease, that the only wonder is why it was not placed on the statute-book a generation ago. Further important provisions are made in the case of death from accident in a factory or workshop. Notice of occurrences must be given and a full register of them kept by the owner or occupier. A factory inspector must also attend the subsequent inquest, and the home secretary is furnished with powers for additional investigation should he think fit. Another most salutary feature of the new bill is that laundries carried on by way of trade, or for purpose of gain, are brought under control of the Factory Act. In steam laundries fans must be provided to regulate the temperature of ironing-rooms and to carry off the steam of wash-houses; stoves are to be separated from work-rooms; the use of gas-irons emitting noxious fumes is forbidden, and floors are to be kept in good condition and properly drained. These improved conditions cannot fail to confer an immense boon upon a hitherto neglected and oppressed class of workwomen. At the same time it is not a little curious that women engaged in this laborious and unhealthy trade are allowed to be employed for excessive hours of labor. A number of provisions are made with a view to enforcing the duties of employers in the observance of sanitation, of the fencing of machinery, of the affixing of notices, and of the general carrying out of their responsibilities under the act. In the case of tenement factories we note the practical point that the owner is made responsible in place of the occupier, who is often a man of straw."

The new law is manifestly a step in the right direction and constitutes a notable landmark in the history of factory legislation.—*Jour. Am. Med. Assn.*

Department of Physiological Chemistry.

WITH SPECIAL REFERENCE TO DIETETICS AND NUTRITION IN GENERAL.

Edited by R. H. CHITTENDEN, PH.D.,

Professor of Physiological Chemistry in Yale University.

THE INFLUENCE OF ALCOHOL ON PROTEID METABOLISM.

THE study of the influence of alcohol upon the nutrition of the animal body has always been attended with difficulty. Physiologists have never quite agreed as to its influence upon digestion, secretion, absorption, and especially as to its action upon general metabolism. This has no doubt been due to the natural variation in action dependent upon the conditions of experiment, a fact which may be taken as an illustration of the manifold physiological action of alcohol. Thus, years ago, some observers reported that the administration of alcohol was followed by a diminished excretion of nitrogen, thus implying a diminution of proteid metabolism. Other observers, on the contrary, found the elimination of urea or nitrogen wholly unchanged by the administration of alcohol. Obviously, if alcohol is in any sense akin to a non-nitrogenous food, its ingestion should be followed under appropriate conditions by a decreased metabolism of proteid matter. But in attempting such experiments it must not be forgotten that alcohol, while possibly possessed of some food value, has also a marked physiological action, the intensity of which may easily overshadow any effect, beneficial or otherwise, it might exert on the general processes of nutrition. Hence, variations in dosage and in the conditions under which the substance is taken may manifestly lead to divergent results.

Large doses of alcohol will naturally be followed by the excretion of a portion of the substance wholly unchanged; but such a fact does not by any means constitute proof that alcohol cannot be oxidized in the body and thus serve as a source of energy. Experiment, indeed, has shown that when alcohol is administered in small quantity it may be completely burned and its oxidation attended with the liberation of a corresponding amount of energy. This being so, we can properly attribute to alcohol a certain food value. Whether it is a proper, safe, or economical food, physiologically considered, is not the question under discussion, but that it does possess some food value there is hardly any doubt.

As far back as 1879, Munk, experimenting with dogs, found that in general moderate doses of absolute alcohol (1–1½ c.c. per kilo. of body-weight) lessen the decomposition of proteid matter in the body to the extent of 6–7 per cent., while larger doses of 2 c.c. absolute alcohol per kilo. of body-weight increase proteid metabolism 4 to 10 per cent. Von Boeck and Bauer likewise noticed, in conformity with the above observations, that small doses of alcohol caused a diminished excretion of carbonic acid and inflow of oxygen, while larger doses led to an increased consumption of oxygen and excretion of carbonic acid. Munk also called attention to the fact that after the administration of large doses of alcohol the giving of small doses was not then followed by any diminution in the consumption of proteid matter, or at least not to any marked degree.

In some experiments made by the writer in 1891,* likewise on dogs, it was found that the ingestion of alcohol led to a slight decrease in the output of nitrogen. More noticeable, however, and of greater significance was the fact that associated with this slight decrease in the excretion of nitrogen was a marked and constant increase in the output of uric acid. Our results in the main led to the conclusion that alcohol, so far as its general influence on proteid metabolism is concerned, acts chiefly as a non-nitrogenous food. As such, it would naturally yield a certain amount of energy by its own oxidation, and thus tend to protect slightly the consumption of proteid matter and hence conserve the tissues. This view would accord with the results obtained by Reichert† in his study of the action of alcohol on animal heat functions. Assuming this view to be correct, one would not expect any very great diminution in the nitrogen output under the influence of alcohol; in fact, no greater than was observed in some of our experiments, since it can save the tissues, or the proteid foodstuffs, only to the extent of the energy which it can itself yield. At the same time it must be remembered that alcohol is a potent drug, and as such may exert at times some specific action upon metabolic changes. Possibly in this direction lies the explanation of the decided increase in the elimination of uric acid. The results obtained certainly indicate that alcohol has a decided and specific action in this direction, increasing the excretion of uric acid to a very noticeable degree, and that at a time when the elimination of urea and total nitrogen is being diminished. The writer has thus been inclined to believe that alcohol, in virtue of its character as a non-nitrogenous food, may tend to diminish somewhat the general metabolism of proteid matter, thus conserving the tissues, while at the same time it has a more specific action upon certain phases of nutrition, as shown in its tendency to increase the excretion and probably the production of uric acid. This latter action, however, has lacked confirmation, and the writer has always intended to repeat the experiments on man with a view to obtaining, if possible, fuller data on the subject.

Quite recently, Donogány and Tibáld* have reported a series of experiments upon the influence of alcohol on proteid metabolism, which give the desired confirmation, for they likewise find that the amount of uric acid excreted during the ingestion of alcohol (by dogs) is greatly increased over the normal. Their experiments show that very small doses of alcohol tend to increase the output of total nitrogen, while larger doses diminish the excretion of nitrogen. Uric acid, however, is always increased in amount, not only absolutely but also in proportion to the total output of nitrogen. The results thus strengthen the position that alcohol has a specific influence upon certain phases of proteid metabolism, doubtless leading to some perversion of the normal functions by which an increased production of uric acid results.

The view that alcohol, when taken in moderate doses, can have only a limited effect upon the consumption of proteid matter receives added confirmation from some recent experiments by Strim.† This investigator endeavored to ascertain how far alcohol can take the place of fats and carbohydrates, compared isodynamically, in the protection of proteid matter, and also how far alcohol is of importance in aiding or retarding the absorption of nitrogenous foods from the alimentary canal. The experiments, made upon his own person after the body had been brought into a condition of nitrogenous equilibrium, tend to show, as might be expected, that 50–80 grams of alcohol, taken daily, have no very marked action. In one experiment, alcohol seemed to facilitate the absorption of proteid matter, while in a second experiment there was slight retardation. Similarly, the general effect on proteid metabolism was slight. Apparently, no effort was made to learn what effect was produced on the formation and excretion of uric acid.

---

* *Journal of Physiology*, vol. 12, p. 220.

† *Therapeutic Gazette*, February, 1890.

* Abstract in *Jahresbericht für Thierchemie*, Band 24, p. 552.

† Abstract in *Centralblatt für Physiologie*, Band 8, p. 582.

It is of course understood that the foregoing statements as to the effects of alcohol on proteid metabolism do not afford any basis for conclusions regarding the general physiological effects of alcohol, or its usefulness as a part of an ordinary diet. It does not necessarily follow from the results quoted that the moderate use of alcoholic drinks will tend to economize the resources of the human body by diminishing proteid metabolism. As Foster well says, "The prominent physiological problem of dietetics is not either to increase or diminish the metabolism of the body but to direct that metabolism into proper channels; and whether in each particular case a given dose of alcohol gives a right or wrong turn to the physiological processes of the body, depends on the particular circumstances of the case."

It is, however, very desirable for us to have as complete knowledge as possible of the various ways in which alcohol and alcoholic drinks affect the nutritional processes of the body.

PHYSIOLOGICAL NOTES.

By Lafayette B. Mendel, Ph.D.

CARBONIC OXIDE POISONING.

Poisoning with carbonic oxide (CO) is not uncommon; the results are serious if not fatal, and the treatment is always difficult. Carbonic oxide is present in so-called "water gas," which has become a common constituent of illuminating gas. It is a source of danger in coal-mines and other places, being a constituent of after-damp, formed by the explosion of an excess of fire-damp or coal-dust in the presence of air. It is met with in connection with the spontaneous heating or actual ignition of coal, which is so common in colliery districts; furthermore, it is present in large quantities in the smoke of blasting-powder and of some other explosives. Carbonic oxide forms, as is well known, a compound with the hæmoglobin of the red blood corpuscles (carboxyhæmoglobin) when inhaled with the air, just as oxygen forms oxyhæmoglobin.

Dr. Haldane,* of the University of Oxford, has contributed some interesting facts to our knowledge of the poisonous action of carbonic oxide. This gas tends, as indicated above, to render the red blood corpuscles useless for the functions of respiration in the tissues. The symptoms produced in a healthy and normal individual resemble very closely those produced by atmospheres in which the oxygen tension is considerably diminished, either by reduction of atmospheric pressure or by reduction of the oxygen percentage. Relatively slight hyperpnœa, palpitations, and feeling of fulness in the head, together with a tendency to impairment of the senses and loss of power over the limbs, are the characteristic symptoms produced both by carbonic oxide and by a diminished supply of oxygen in the air breathed. The fact that in the earlier stages of CO poisoning these symptoms occur only after exertion is also characteristic of a moderately diminished oxygen supply as shown by the records of mountain travellers and balloonists at high altitudes. Certain animals which have no hæmoglobin in their blood are not affected at all by CO. There is every reason to believe, from experiment, that the symptoms produced by CO are attributable solely to diminished oxygen-carrying power of the blood. The symptoms thus depend on the extent to which the hæmoglobin has been saturated. CO is a "cumulative" poison. The effects produced by it do not become sensible (during rest) until sufficient has been absorbed for the corpuscles to become about one-third saturated, while with half-saturation the symptoms become urgent. As a possible explanation, Dr. Haldane suggests that the cerebral symptoms produced by CO or want of O may even during rest be in part due to circulatory changes, and not merely to direct action of the abnormal blood on nervous centres. When air containing CO is breathed about half of the CO actually inhaled is absorbed. The time required for the production of sensible symptoms in an adult man depends on the time required for the inhalation of about 660 c.c., or the absorption of about 330 c.c. of the pure gas.

---

* *Journal of Physiology*, vol. xviii.

Distinct symptoms, appreciable during rest, are not produced by CO in otherwise normal air, until at least 0.05 % of the gas is present; with about 0.2 % they become urgent. "With a given percentage of CO in the air breathed a certain percentage saturation of the blood with carbonic oxide is reached within about two and a half hours, and not afterwards exceeded, however long the breathing of the vitiated air may be continued. The disappearance of carbonic oxide from the blood when fresh air is again breathed is always much slower than the absorption of the gas, and is chiefly due to dissociation of carboxyhæmoglobin by the mass influences of the oxygen in the pulmonary capillaries and consequent diffusion of the gas outwards through the alveolar epithelium."

Since the time required for the symptoms to appear (or disappear) in different animals was found to be proportional to the respiratory exchange per unit of body-weight, and therefore to be about 20 times as long in a man as in a mouse, Dr. Haldane notes that it is possible with safety to use a mouse as an indicator of the presence of poisonous proportions of CO in an atmosphere (in a coal-mine for instance). This suggestion is the more timely when it is remembered that the lamp, which the miner usually trusts to give him indications of the presence of dangerous gases, does not suffice for detecting small quantities of CO in air. It is this fact which makes after-damp, smoke, etc., so dangerous to men who attempt to penetrate them while trusting to a lamp to give warning of any danger. Chemical tests adapted to such circumstances are also wanting.

Dr. Haldane contributes the following regarding the treatment of carbonic oxide poisoning: "The first point to attend to is the prompt restoration, if necessary, of a sufficient supply of oxygen to the tissues, and particularly to those of the central nervous system. The examination of a drop of highly diluted blood will at once give information as to whether, when the patient is seen, there is still any dangerous amount of interference with the oxygen-carrying power of the blood. If it is not distinctly pinker than normal blood diluted in a similar manner, it may be inferred that the patient is now suffering, not from the present want of oxygen, but from the effects of previous want of it. If the diluted blood is markedly pink, good effects may be hoped for from the administration of oxygen if it is at hand. Apart from the administration of oxygen, vigorous artificial respiration should if possible be continued until the pink color of the blood becomes indistinct. It will probably also be wise to keep the head low and the limbs raised, so as to increase if possible the blood-supply to the central nervous system, which seems to be the part of the body most sensitive to the want of oxygen. Another point which may probably be of importance is to prevent fall of temperature due to diminished heat-production. Such fall of temperature is an exceedingly probable secondary result of carbonic oxide poisoning. It is known to be one of the dangers of climbing at high altitudes, where the conditions as regards oxygen supply are similar to those in slight cases of carbonic oxide poisoning. . . . Whether or not fall of temperature plays a part in carbonic oxide poisoning in large animals such as man, it certainly does so in the case of mice. The fall is apparently accelerated by dilation of the blood-vessels of the skin. Warming the animal restores it; and possibly a similar restorative effect might be produced in man by warm baths, or some measure of the same kind, in cases where the body temperature has fallen. Such a degree of deprivation of oxygen as occurs in severe cases of carbonic oxide poisoning must certainly cause serious damage of a more or less lasting character to the tissues, and particularly, as shown by the experiments of Böhm, to the central nervous system. On either the nature of this damage, or on means of treatment for it, such experiments as I have yet made throw no further light. It is perhaps usually the damage to the central nervous system which causes death—in some cases long after the patient has been restored to pure air."

REGULATION OF BODY TEMPERATURE IN YOUNG ANIMALS.

Our knowledge regarding the important function of heat-regulation in the body is rather incomplete. There are various experiments recorded in which puncture or stimulation of certain cerebral areas has brought about marked rise of temperature without producing other obvious effects.[*] Calorimetric observations have further demonstrated that this rise is due to increased production of heat, and the existence of heat centres in the brain has in this way been demonstrated. As to the development of the function of heat-regulation in the body, Dr. Pembrey[†] has published a series of observations on young animals. He arrived at the following conclusions, among others: "In newly born animals, the power of heat regulation varies according to the development of the animal at birth. Young animals such as mice, rats, and pigeons, which are born blind, naked, and helpless, respond to changes of external temperature in a way somewhat similar to that seen in cold-blooded animals; the variations in the respiratory exchange and the temperature of the animals are in the same direction as the changes of external temperature. These young animals cannot regulate their temperature. Young animals, on the other hand, such as guinea-pigs and chickens, which are born in a condition of high development and with protective coverings, are able even at birth to maintain a constant temperature, provided that the changes in external temperature are not too excessive."

"It is important to consider here the part played by the loss of heat; in small naked animals, like young mice, the cutaneous surface in relation to the mass of the body is very large and thus more rapid cooling will take place. But that this is only a secondary factor to the development of the power of regulation is shown by the fact that when the fur is quite long an exposure to cold does not increase and maintain the increase in the output of carbonic acid so well as in the adult, and after a time the temperature of the young animal falls. Moreover, a pigeon 15 days old can maintain its temperature fairly well, although three-quarters of its body are naked."

"The activity of the animal has also to be considered. In adult warm-blooded animals and in newly born animals like the guinea-pig and chick, a low temperature increases the activity of the animal. . . . In warm surroundings, on the other hand, the animal is quiet and often goes to sleep; if the temperature is very high it lies extended to expose as large a surface as possible and sweats. In young animals, which only imperfectly regulate their temperature, muscular activity is often most marked and maintained at the higher temperatures. The first effect of a fall is often, it is true, to make the animal active, but its movements soon become feeble and as regards their purpose are of a similar nature to shivering."

"The development of the power of heat-regulation proceeds simultaneously with the development of the nervous and muscular systems. At the same time the relation of the cutaneous surface to the mass of the young animal and the absence or presence of protective coverings are factors, but only of secondary import."

THE FUNCTIONS OF THE STOMACH.

In an interesting lecture held on "Oberpfälzischen Aerztetag 1895,"[*] Prof. Moritz, of Munich, gave a résumé of the more recent investigations bearing on the functions of the stomach. He called attention to the fact that the study of the physiology and pathology of the stomach was for a long time confined to the chemical phases of digestion. The anticipation of great progress by this means in the diagnosis and treatment of gastric diseases has not been realized, and a reaction has begun towards a study of the stomach functions in other directions.

---

[*] Most recently demonstrated by. Prof. Tangl. of Budapest, on the horse, *Pflüger's Archiv* 1895.

[†] *Journal of Physiology*, xviii 36[illegible]

[*] Reprinted in *Münchener medic. Wochenschr.*, no. 49, 1895.

That the stomach is not indispensable to nutrition has been repeatedly demonstrated since the classic experiments of Czerny and Kaiser, in which the stomach was completely removed from a dog without any apparent ill-effects on the health of the animal. v. Noorden has also shown that patients in whom the gastric digestive processes were entirely insufficient owing to a lack of hydrochloric acid, could, nevertheless, be satisfactorily nourished. The chemical processes in the stomach practically go little further than to transform the contents to a viscid, semi-fluid mass which will readily pass the pylorus. Herein lies the justification for prescribing food in semi-solid or fluid form in insufficient gastric digestion. According to the experiments of v. Mering, Brandl, Moritz, and others the stomach cannot be regarded as an organ for absorption, except for alcohol. This circumstance contributes to keep the food material in a diluted condition—a condition which is in turn favorable for the absorption of digestive products in the intestine. Thus Röhmann has found that 0.5 % sugar solutions are absorbed far more completely in the intestine than more concentrated solutions. Solutions of 5 % strength are sufficient to cause disturbances of intestinal functions.

It seems probable that the stomach also protects the intestine against extremes of temperature, as well as against undesirable concentration of digestive products. It is to be assumed that temperature changes are not readily endured by the intestine, whereas they are, as is well known, readily endured by the stomach. It has been shown by Quincke in experiments on a boy (gastrotomy) that an equalization of different temperatures speedily takes place in the stomach.

The motor functions of the stomach have also received more attention in recent years. It has been shown that, as regards motor arrangements, the stomach consists of two entirely distinct regions; in the fundus no sphincter-like contractions normally take place. Thus, Hofmeister demonstrated on the extirpated stomach of the dog that merely peristaltic waves pass over the fundus region, while the motor phenomena of the pyloric region are of the nature of total, sphincter - like contractions. While the latter take place the fundus contents are separated from the pyloric end by the contraction of a sphincter muscle between these two regions (sphincter antri pylori). The fundus may accordingly be designated as a digestion chamber, while the pyloric end is the real motor organ. The gastric secretory arrangements correspond with this division of functions.

Bunge has put forth the theory that the chief function of the stomach is the antiseptic action of the hydrochloric acid secreted. The importance of the normal secretion as a protection against intestinal infection, *e.g.*, typhoid and cholera, is well known to every clinician. We can, however, go further than Bunge, and designate the stomach, as does Prof. Moritz, as an organ adapted to decreasing or removing the injurious effects which the food ingested might exert upon the intestine. These effects might be of bacterial, chemical, or thermal nature, and are moderated by disinfection, dilution, and moderation of temperature on the part of the gastric secretion. The stomach further serves as a reservoir, which regulates the supply of food material to the intestine for more complete digestion and absorption.

◆

ON THE NORMAL OCCURRENCE OF IODINE IN THE ANIMAL BODY.

By E. Baumann.

Translated by Wm. J. Gies, Ph.B.

About a year and a half ago my colleague, Prof. Kraske, directed my attention to thyroid-gland therapy, which at that time had been placed on a higher plane by reason of the interesting observations of Emminghaus and Reinhold,† who found that the feeding of thyroid glands led to a pronounced reduction of goitre. At the request of Prof. Kraske I made, by different methods, various preparations from the thyroid which possessed the activity of the fresh glands. As similar products soon appeared in the market, however, the experiments carried out in this direction were discontinued.

---

* Translated from Hoppe-Seyler's *Zeitschrift für physiologische Chemie*, Band 21, p. 318.

† *Münchener med. Wochenschr.*, 1894, no. 31.

The object kept constantly in view in these researches—the isolation of the active substance of the thyroid—could be followed systematically only after I had gained the co-operation of Dr. Roos, who for about a year, by continued examinations of the products separated from time to time, both in regard to their action upon man and their influence in metabolic experiments upon animals, determined the correctness of our method of procedure.

The results hereafter to be described might, however, not have been obtained at all, or at least not so soon, had not the dye manufacturers, Fr. Bayer & Co., of Elberfeld, from their abundant means and by their ready assistance, made it possible for us to operate in the course of a few months with the essential substance obtained from several thousand thyroid glands from sheep.

Before the isolation of the characteristic substance of the thyroid can be undertaken with expectation of success, the question whether this body withstands the action of strong acids and of alkalies must be answered. Dr. Roos* has already informed us upon one of these points, which he has investigated at my suggestion. He has shown that thyroid glands may be boiled for days at a time with 10 per cent. sulphuric acid without causing the loss of the essential constituent. The latter is thrown down from the brownish fluid, on cooling, in the form of a fine, flocculent precipitate, which is almost insoluble in cold water and in acids, and hence can be separated from the soluble products by filtration.

The active substance of the thyroid is withdrawn from the moist precipitate obtained in the above process by repeated boiling with alcohol of about 85 per cent. By evaporation of the alcoholic solution, a residue is obtained from which adherent fat and fatty acids can be separated by appropriate treatment with petroleum ether. The substance left undissolved by the latter process is dissolved in 1 per cent. sodium hydroxide and again thrown down from the filtered brownish solution with dilute sulphuric acid in the form of grayish brown flocks. After again filtering, washing, and drying the precipitate thus collected a brownish product, small in quantity, is obtained, its weight being equal to 0.2–0.5 per cent., calculated upon the fresh gland. Dr. Roos, from a large number of detailed observations on man and on dogs, has adduced certain proof that this product, the preparation of which I have sketched above, not only contains the active substance of the thyroid glands, but also that it is approximately as active as a corresponding quantity of fresh thyroid.

We shall next enter upon a description of the active constituent of the thyroid gland. Its technical manufacture has been undertaken by Fr. Bayer & Co., of Elberfeld, who have devised a method for its extraction on a large scale by a process now patented. They have named this substance Thyroiodin.

Thyroiodin is a brownish colored, amorphous compound, which, upon heating, is decomposed with considerable swelling and with an odor of the pyridin bases. It is almost insoluble in water; in alcohol it dissolves with difficulty. In dilute alkalies it is readily soluble and from such solutions is again precipitated by acids. Concentrated sodium hydroxide, upon heating, brings about gradual decomposition. It manifests no proteid reactions, though it is constantly found to contain phosphoric acid in organic combination. The quantity of the latter is small, however, and, calculated in terms of phosphorus, amounts to not more than 0.4 to 0.5 per cent. This circumstance suggested the possibility that a cleavage product of the nucleic acids of Kossel may have been obtained, but continued research has shown that the phosphorus content of the substance is not raised during its further purification. At all events, it is of importance to further follow up the relationship of this body, which is, perhaps, a cleavage product of some form of nucleic acid.

---

* *Zeitschr. f. physiol. Chem.*, Bd. xxi., p. 19 ff.

In now taking occasion to make a communication upon this substance, which at first sight appears uninteresting, I shall be justified in so doing by the very remarkable fact that thyroiodin is an iodine compound, containing iodine in relatively large quantity and in very close organic combination.

When a very minute quantity of thyroiodin is fused with caustic soda and potassium nitrate, the resultant mass dissolved in water, and this solution acidified with nitric acid, a fluid is obtained which is yellow in color and in which, upon agitation with chloroform, the presence of iodine is demonstrated by the consequent violet color imparted to the latter. After the solution of the fused mass has been concentrated, addition of acid to the warm fluid is followed by the evolution of a light violet vapor which also indicates the presence of iodine. Upon making this observation for the first time I was loath to believe in the presence of iodine. I did not remain long in doubt upon this matter, however, as all of the reagents used were found to be perfectly pure and free from this element.

When a sufficient quantity of the substance had been placed at my command I carried out a quantitative determination in the following way: 0.313 gram of thyroiodin was mixed in a silver crucible with 1.5 gram of pure sodium hydroxide which had been liquefied with a few drops of water, and after the addition of a few crystals of potassium nitrate the mixture was so fused that hardly any deflagration ensued. The colorless, fused mass was dissolved in 100 c.c. of water and freed from a faint turbidity by filtration. The thoroughly cooled solution was then strongly acidified with nitric acid, and at once, in order to transform the liberated iodine into hydriodic acid, the fluid was treated with a few drops of sulphurous acid. Silver nitrate produced in the colored solution a decidedly yellow precipitate, which, after its complete separation, was thrown upon a filter and repeatedly washed with ammonia. (The washing is approximately known to be complete when the ammoniacal wash-water shows only a very faint turbidity upon acidification with nitric acid.) The silver iodide collected on the filter was weighed in the usual manner after ignition of the paper. Its weight amounted to 0.017 gram AgI = 0.00919 gram or 2.9 per cent. of iodine.

The weighed silver iodide, together with a little potassium-sodium carbonate, was afterwards fused at a high heat in the flame of a blast-lamp. The aqueous solution of the resultant fused mass, after acidification with nitric acid, was colored yellow upon the addition of a drop of chlorine water, and with starch paste gave an intensely blue coloration. Chloroform withdrew the free iodine from the fluid, as it became intensely violet in color. With palladium chloride, the black precipitate of palladium iodide was obtained.

A substance found to contain nearly three per cent. of iodine must obviously possess a very great molecular weight. It was next desirable, therefore, to ascertain whether, during further purification of the product, the iodine content would mount higher. To this end I employed a milk-sugar triturate of thyroiodin from 600 grams of fat-free sheep thyroid glands, for which I am indebted to the manufacturers of Elberfeld. The milk-sugar was removed by solution in water, and the undissolved thyroiodin filtered off. After twice-repeated solution in sodium hydroxide and precipitation with sulphuric acid, a preparation was obtained the weight of which, after drying at 100° C., amounted to 1.098 grams. In testing this substance, iodine vapor was evolved upon heating with sulphuric acid. When heated alone this appearance was not observed. 0.848 gram of this preparation of thyroiodin, upon determination of the iodine by the method previously described, gave 0.146 gram of pure silver iodide. From this weight it is found that the content of iodine amounted to not less than 9.30 per cent.

A determination of the phosphoric acid content carried out simultaneously gave, calculated in terms of phosphorus, only 0.56 per cent. Accordingly, it is quite probable that the phosphoric acid contained is not combined in the iodine compound, since upon purification of the substance it did not increase in quantity corresponding to the amount of iodine.

I think I am justified in concluding that, if purified still further, the substance will show even a higher content of iodine. In the method hitherto followed for the determination of iodine losses are inevitable. However, this method has previously rendered good service, and may certainly be considered as sufficiently accurate to prove the presence of iodine. In twenty different preparations of thyroiodin, of which some were made here, some in Elberfeld, I proved the presence of iodine. All of the preparations, which Dr. Roos has likewise tested, contained an abundance of iodine. Such preparations as had been obtained by boiling the glands with strong sodium hydroxide, however, and which manifested weak activity, or none at all, were found to be free from iodine, or gave at most only a faint iodine reaction.

According to a previous statement, the amounts here presented for the iodine content of the analyzed products are evidently somewhat low; in no instance, however, too high.

The quantity of silver iodide obtained in the second determination was again fused with potassium - sodium carbonate. The fused mass was dissolved in water, and the solution filtered from the metallic silver, acidified with nitric acid and precipitated with palladium chloride. The precipitate of palladium iodide thus formed was collected upon a small asbestos filter, washed and dried at 105° C. The filter with the palladium iodide was brought into a thin-walled tube of soft glass—ten millimetres wide and sealed at one end—and then pushed to the closed end of the same with a glass rod. Upon heating, the palladium iodide was decomposed, whereupon the dark violet vapor of iodine collected over the asbestos and the palladium. The tube was then melted off above the asbestos, while at the same time it was sealed at the other end. The tube, twenty-five centimetres long, then contained the pure iodine, which, through the distance of about two centimetres and a half, covered the sides in the form of dark gray crystals. After gently warming, the entire tube became filled with the violet vapor of iodine, which, upon gradual cooling, condensed into beautifully formed iodine crystals. In these experiments it has been very distinctly proved that the thyroid glands from sheep contain iodine in organic combination. I have preserved the tube containing the pure iodine separated from the thyroid glands as a memento of this noteworthy experiment.

The human thyroid glands contain the same iodine compound as that found in the sheep thyroids, or at least one very similar to it. I have demonstrated this in a study of the thyroid glands from two old people, one of whom died of cancer of the stomach, the other of pulmonary consumption. Both I owe to the kindness of my respected colleague, Prof. Ziegler.

The problem next considered was whether goitre contains iodine, and if so, how much. For this purpose there was at my disposal a goitre which had been preserved for about two years in alcohol, for which I am likewise indebted to Prof. Ziegler. It was a typically developed colloid goitre. Upon analysis of 100 grams of the substance, after the previously described method, *the presence of iodine* was distinctly proved. As it appeared to me, however, the content of iodine was essentially less than in the normal glands. But a final judgment upon this matter is not possible until reliable researches upon the normal iodine content of the human thyroid have been made. I refrain, therefore, from drawing conclusions which the last-named observation seems to suggest. Additional experiments will soon bring about certainty upon the question here under consideration.

Iodine was also found to be present in the thyroid glands from swine. Here, the quantity of iodine appeared, however, to be considerably less than in the thyroids from man or sheep.

The *thymus gland* from the ox contains, on the other hand, no iodine, or, more correctly speaking, no appreciable quantity of iodine was obtained from it during our investigations. The casein of milk, as also horn substance, and mother liquors from the preparation of tyrosin, were likewise found to give no iodine reaction. A preparation of nucleic acid, which I owe to my friend Prof. A. Kossel, of Marburg, was also found to be entirely free from iodine.

Not a few well-known facts appear in a new light now that thyroiodin—an iodine compound—is known to exist in the thyroid gland. In the first place the iodine treatment of goitre comes into consideration. It is now intelligible why the latter is able to afford the same relief as thyroid-gland therapy, to which fact Kocher has recently alluded. We obtain, however, a deeper insight into this relation and can give a simple explanation of the fact, upon which all observers agree, that the action of the thyroid glands is exceedingly rapid, commencing much sooner than is the case with iodine treatment. Thus, the external application of iodine simply favors the formation of those substances which are produced in the normal thyroid gland and which by thyroid-gland therapy are given to the system already performed. The efficacy of this treatment is therefore evidently not to be referred to an action of free iodine or an iodine salt, but to the formation of that *specific organic iodine compound* which we have isolated as far as possible in thyroiodin. This process appears to be quite similar to the assimilation of iron, the action of which upon the organism first takes place when it is transferred into that organic iron combination of which hæmoglobin consists.

The close similarity between the action of iodine and thyroid-gland treatment led Kocher* a short time ago to question whether the normal thyroid gland did not contain iodine. Tschirch, who carried out the research, obtained a completely negative result, which is easily understood, however, from the fact that he incinerated the organ directly, whereby the small quantity of iodine present may have been lost. I have positively convinced myself that by careful fusion of 1 gram of dry thyroid gland, from man or from sheep, with caustic soda and potassium nitrate a very distinct iodine reaction may be obtained. According to an approximative estimation, the iodine content in the thyroid from man and from the sheep amounts to about a milligram per gram of dry gland.

All of the questions, however, which relate to goitre treatment, our knowledge of which, through the researches of Kocher and his pupils, has recently been very materially enlarged, are by no means more easily understood than heretofore, in spite of the new data furnished by the isolation of thyroiodin. In this connection may be mentioned particularly, among other things, the observation that the exclusive use of *boiled* water not infrequently manifests a favorable influence upon goitre. Upon this and similar questions subsequent researches may bring an explanation.

In order to demonstrate absolutely the presence of iodine in thyroiodin from the thyroid gland of the sheep the following method may be advantageously used:

25–30 grams of thyroid gland, freed as much as possible from adherent fat, are boiled with about 100 c.c. of 10 per cent. sulphuric acid for four to eight hours in a flask connected with an inverted condenser, until almost all of the material has passed into solution. The fluid is cooled in ice-water and then filtered. (Admixed fat floating about upon the fluid may in large part be directly skimmed off.) The slight, brownish colored precipitate* is washed with water, and together with the filter is placed in 250 c.c. of alcohol of about 85 per cent., and extracted with boiling alcohol two or three times. The alcoholic extracts, filtered while hot, are evaporated to dryness. The residue thus obtained, together with a little caustic soda and a few drops of water, is placed in a silver crucible and, after the addition of a few crystals of potassium nitrate, is gently fused. The cooled, fused mass is dissolved in water, the solution acidified after cooling with a little concentrated nitric acid and then quickly shaken with 3–6 c.c. of chloroform, the latter becoming violet colored by reason of the separated iodine. There is always so much nitrite contained in the fusion that the iodine is liberated upon acidification. The skilful and careful worker can easily prove the presence of iodine in thyroiodin with even a much smaller quantity of thyroid gland.

---

* *Corresp.-Bl. f. Schweizer Aerzte*, 1895, p. 18.

* A small quantity of the iodine compound at this point goes into solution.

Instead of boiling with sulphuric acid, the fresh thyroid glands may also be digested with artificial gastric juice, whereby the thyroiodin remains undissolved with the nucleic acids. After the digestion has been completed, the finely flocculent precipitate suspended in the fluid is filtered off and from it the thyroiodin is extracted with hot alcohol. The presence of iodine may then be detected in the residue obtained from the alcoholic solution by the method detailed above.

The discovery of this organic iodine compound in the thyroid gland places a long row of important questions before the experimentalist, and opens a new field for investigation, in which continued research promises to bring to light many a surprising result. The interesting fact that a definite organ of the system is able to selectively store up a body reaching it in exceedingly minute quantity and capable of transforming it into a functionally important substance is scarcely anywhere so clearly seen as in the iodine compound of the normal thyroid gland. Our discovery of this new body promises to lead to the special investigation of the other organs now included in glandular therapy.

As to whether iodine is found in any of the organs of the body besides the thyroid, and if so in what others, and also just where the source of the iodine importation in man and in animals is to be sought, I cannot now commit myself. Neither do I care to express any opinion as to the character of the iodine bond, whether it is an ordinary iodine substitution product, or an iodo or an iodoso compound.

In this connection, mention should be made of the fact that an extensive literature already exists upon the occurrence and widespread distribution of iodine in the animal and vegetable kingdoms. Chatin * believed he had conclusively demonstrated that air, rain, and snow-water, as also river-water, all plants, the fermented beverages, milk, eggs, and earth of the field, contain iodine. Chatin soon after (1851) proposed the theory of normal iodine, according to which cretinism and goitre appear in regions where the iodine in the drinking-water is entirely or almost completely lacking. This theory, maintained with great persistence by Chatin, soon lost the interest attached to it in many quarters, since the assumption upon which it was based was found to be entirely gratuitous. Macdonald, Luca, Nadler, and many others, on the ground of the results of their own researches, contested absolutely the occurrence of iodine in the air and in water, and Chatin was finally driven to the alternative that the reagents used by him were not free from iodine. Thereupon the theory fell into oblivion, although Chatin insisted upon the correctness of his researches. For more than thirty years these questions have been considered as settled.

The presence of iodine in the ash of land plants has frequently been proved. Fehling † and others have shown its occurrence in the potash prepared from molasses, the former having made a quantitative determination of the content of iodine. That iodine is found not only in the plants but also in the animals of the sea has long been known. The quantity of this element found has always been very small, however. It will be of interest to ascertain whether the Laminaria and Fucus species, which possess the relatively largest amount of iodine, contain that element in an organic combination, and whether the iodine in these plants is to be looked upon as an accidental, or as an indispensable constituent.

After the conclusion of the foregoing experiments I received Dr. S. Fränkel's treatise "Upon Thyreo-antitoxin, the Physiologically Active Constituent of the Thy-

---

***Compt. rend.*, xxxi., p. 280. *Jahresber. d. Chem.*, 1850, p. 268.

†*Ann. d. Chem.*, Bd. 75, p. 68, and *Jahresber. d. Chem.*, 1852, p. 775.

roid Glands."[*] The body prepared by Fränkel, to which the formula $C_6H_{11}N_3O_5$ has been ascribed, as regards its manner of extraction and its characteristic qualities, bears absolutely no relation to the thyroiodin studied by Dr. Roos and myself. Since decisive physiological experiments have not yet been carried out with Fränkel's substance, a definite judgment upon the nature of its action is, on the whole, not possible at the present time.

In a subsequent communication, in association with Dr. Roos, I shall report upon the preparation of thyroiodin by a method essentially different from any previously employed. The striking fact that the active substance isolated by us is almost insoluble in cold water, whereas other experimentalists have prepared glycerin and water extracts which contain at least a substantial part of the essential compound, will therein be fully discussed.

THE COOKING OF MEATS.[†]

By Chas. D. Woods,

OFFICE OF EXPERIMENT STATIONS.

UNCIVILIZED man differs from civilized man in no more striking way than in the preparation of food. The former takes his nourishment as it is offered by nature; the latter prepares his food before eating, and in ways which are the more perfect the higher his culture.

Meat is rarely eaten raw by civilized people. For the most part, it is either roasted, stewed, fried, or boiled. Among the chief objects of cooking are the loosening and softening of the tissues, which facilitates digestion by exposing them more fully to the action of the digestive juices. Another important object is to kill parasites, and thus render harmless organisms that might otherwise expose the eater to great risks. Minor, but by no means unimportant, objects are the coagulation of the albumin and blood so as to render the meat more acceptable to the sight, and the development and improvement of the natural flavor, which is often accomplished in part by the addition of condiments.

Flavoring materials and an agreeable appearance do not directly increase the thoroughness of digestion, but serve to stimulate the digestive organs to greater activity. As regards the actual amount digested, this stimulation is probably not of so great moment as is commonly supposed. Meat that has been extracted with water so as to be entirely tasteless has been found in actual experiment to be as quickly and completely digested as an equal weight of meat roasted in the usual way.

In general, it is probably true that cooking diminishes the ease of digestion of most meats. Cooking certainly cannot add to the amount of nutritive material in meat; and it may, as we shall see, remove considerable quantities of the nutrients.

BOILING.

If it is desired to heat the meat enough to kill parasites or bacteria in the inner portions of the cut, the piece must be exposed to the action of heat for a long time. Ordinary methods of cooking are seldom sufficient. In a piece of meat weighing 10 pounds the temperature of the interior, after boiling four hours, was only 190° F. The inner temperature of meat when roasting has been observed to vary from 160° to 200° F., according to the size of the piece. In experiments upon the canning of meat it was found that when large and even small cans were kept for some time in a salt-water bath at a temperature considerably above the boiling-point of water, the interior temperature of the meat rose only to 208° in some cases and 165° in others. Large cans of meat are more liable to have bad spots than smaller cans, because the heat in them is not sufficient to destroy the bacteria or other organisms that cause the meat to decompose.

If meat is placed in cold water, part of the organic salts, the soluble albumin, and the extractives or flavoring matters will be dissolved out. At the same time small portions of lactic acid are formed, which act upon the meat and change some of the insoluble matters into materials which may also be dissolved out. The extent of this action and the quantity of materials which actually go into the solution depend upon three things: the amount of surface exposed to the water, the temperature of the water, and the length of the time of the exposure. The smaller the pieces, the longer the time, or the hotter the water, the richer will be the broth and the poorer the meat. If the water is heated gradually, more and more of the soluble materials are dissolved. At a temperature of about 134° F. the soluble albumin will begin to coagulate, and at 160° F. the dissolved albumin will rise as a brownish scum to the top and the liquid will become clear. Upon heating still higher, the connective tissues begin to be changed into gelatin and are partly dissolved out, while the insoluble albuminoids are coagulated. The longer the action of the hot water continues, the tougher and more tasteless the meat becomes, but the better the broth. Treated in this way, flesh may lose over 40 per cent. by weight. This loss is principally water, but from 5 to 8 per cent. may be made up of the soluble albumin, gelatin, mineral matters, organic acids, muscle sugar, and flavoring materials. Part of the melted fat also goes into the broth.

---

[*] *Wiener med. Blätter*, 189[illegible], no. 48.

[†] Extract from Bulletin No. 34, U. S. Department of Agriculture.

It would be a great mistake to assume that the nearly tasteless mass of fibres which is left undissolved by the water has no nutritive value. This tasteless material has been found to be as easily and completely digested as the same weight of ordinary roast. It contains nearly all the protein of the meat, and, if it is properly combined with vegetables, salts, and flavoring materials, makes an agreeable as well as nutritive food.

If a piece of meat is plunged into boiling water, or very hot fat, the albumin on the entire surface of the meat is quickly coagulated, and the enveloping crust thus formed resists the dissolving action of water and prevents the escape of the juices and flavoring matters. Thus cooked, the meat retains most of its flavoring matters and has the desired meaty taste. The resulting broth is correspondingly poor.

The foregoing statements will be of much help in the rational cooking of meats in water. The treatment depends largely upon what it is desired to do. It is impossible to make a rich broth and have a juicy, highly flavored piece of boiled meat at the same time. If the meat alone is to be used, the cooking in water should be as follows: Plunge the cut at once into a generous supply of boiling water, and keep the water at a boiling point, or as near boiling as possible, for ten minutes, in order to coagulate the albumin and seal the pores of the meat; the coating thus formed will prevent the solvent action of the water and the escape of the soluble albumin and juices from the inner portions of the meat. But if the action of the boiling water should be continued, the whole interior of the meat would, in time, be brought near the temperature of boiling water, and all the albumin would be coagulated and rendered hard. Instead of keeping the water at the boiling-point (212° F.), therefore, the temperature should be allowed to fall to about 180° F., when the meat could be thoroughly cooked without becoming hard. A longer time will be required for cooking meat in this way, but the albumin will not be firmily coagulated, and the flesh will be tender and juicy instead of tough and dry, as will be the case when the water is kept boiling, or nearly boiling, during the entire time of cooking.

In boiling sections of delicate fish, as salmon, cod, or halibut, the plunging into boiling water is objectionable, because the motion of the boiling water tends to break the fish into small pieces. Fish should be first put into water that is on the point of boiling. The water should be kept at this temperature for a few minutes, and then allowed to fall to 180°, as in the case of meats.

STEWING.

If both the broth and the meat are to be used, the process of cooking should be quite different from that outlined for boiling meat. Stewing is in this country a much-undervalued method of cooking.

This is probably due partly to the fact that stewing is generally very improperly done, and partly to the general aversion which Americans, consciously or unconsciously, have to "made dishes" of any kind. This aversion probably has its origin in a false notion which spurns economy or any attempt at economy in diet.

In stewing, the meat should be cut into small pieces, so as to present relatively as large a surface as possible, and, instead of being quickly plunged into hot water, should be put into cold water, in order that much of the juices and flavoring materials may be dissolved. The temperature should then be slowly raised until it reaches about 180° F., where it should be kept for some hours. Treated in this way, the broth will be rich and the meat still tender and juicy.

If the water is made much hotter than 180° F. the meat will be dry and fibrous. It is true, that if a high temperature is maintained long enough the connective tissues will be changed to gelatin and partly dissolved away, and the meat will apparently be so tender that if touched with a fork it will fall to pieces. It will be discovered, however, that no matter how easily the fibres come apart, they offer considerable resistance to mastication. The albumin and fibrin have become thoroughly coagulated, and while the fibres have separated from each other, the prolonged boiling has only made them drier and firmer.

BROTHS, SOUPS, MEAT EXTRACTS.

The quantities of the ingredients in a meat broth may be illustrated by a German experiment. One pound of beef and 7 ounces of veal bones gave about a pint of strong broth, or soup, which contained, by weight: water, 95.2 per cent.; protein, 1.2 per cent.; fat, 1.5 per cent.; extractives, 1.8 per cent.; mineral matters, 0.3 per cent.

Very palatable broth can be made by using more water and adding savory herbs. Broths thus made have, of course, a greater amount of water, frequently as much as 98 per cent., or even more, and the nutrients are correspondingly reduced in amount. It would appear from the analysis given above, that the amount of solids in broths is generally small. Consequently, their strong taste and stimulating effect upon the nervous system must be ascribed to the meat bases (flavoring matters) and to the salts of potash which they contain. Besides meat bases, soups contain more or less gelatin, varying directly with the quantity of bones used in the preparation.

The term meat extract is commonly applied to a large number of preparations of very different character. They may be conveniently divided into three classes: (1) true meat extracts; (2) meat juice obtained by pressure and preserved, compounds which contain dried pulverized meat, and similar preparations; and (3) albumose or peptose preparations, commonly called predigested foods.

The true meat extract, if pure, contains little else besides the flavoring matters of the meat from which it is prepared, together with such mineral salts as may be dissolved out. It should contain no gelatin or fat, and cannot, from the way in which it is made, contain any albumin. It is, therefore, not a food at all, but a stimulant, and should be classed with tea, coffee, and other allied substances. It should never be administered to the sick, except as directed by competent medical advice. Its strong, meaty taste is deceptive, and the person depending upon it alone for food would certainly die of starvation. Such meat extracts are often found useful in the kitchen for flavoring soups, sauces, etc. Broth and beef-tea as prepared ordinarily in the household contain more or less protein, gelatin, and fat, and therefore are foods as well as stimulants. The proportion of water in such compounds is always very large.

The preserved meat juice and similar preparations contain more or less protein, and therefore have some value as food.

The third class of preparations is comparatively new. The better ones are really what they claim to be—predigested foods. They contain the soluble albumoses (peptoses), etc., which are obtained from meat by artificial digestion. The use of such preparations should be regulated by competent medical advice.

ROASTING AND BOILING.

The principal difference between roasting and boiling is in the medium in which the meat is cooked. In boiling, the flesh to be cooked is surrounded by boiling water; in roasting, by hot air, although in roasting proper much of the heat comes to the joint as "radiant" heat. In both cases, if properly conducted, the fibres of the meats are cooked in their own juices.

When the meat alone is to be eaten, either roasting, broiling, or frying in deep fat is, when properly done, a more rational method than boiling, for the juices are very largely saved. The shrinkage in a roast of meat during cooking is chiefly due to a loss of water. At the same time small amounts of carbon and nitrogen are driven off, and a little acid is produced which dissolves some of the constituents of the meat. The fat undergoes a partial decomposition into fatty acids and glycerin, and a little of it is volatilized.

It is interesting, and at the same time important, to remember that the smaller the cut to be roasted the hotter should be the fire. An intensely hot fire coagulates the exterior and prevents the drying up of the meat juices. This method would not, however, be applicable to large cuts, because meats are poor conductors of heat, and a large piece of meat exposed to this intense heat would become burned and changed to charcoal on the exterior long before the heat could penetrate to the interior. Hence the rule: The smaller the cut to be roasted, the higher the temperature to which it should be exposed.

The broiling of a steak or a chop is done on exactly this principle. An intense heat should be applied, to thoroughly coagulate the albumin and stop the pores, and thus prevent the escape of the juices. A steak exposed to an intense heat for ten minutes is thoroughly cooked, and has yet that rare, juicy appearance which is so desirable.

THE PRINCIPLES OF DIETETICS.*

By Prof. J. Uffelmann.

Even in ancient times, dietetics was admitted to be of the greatest importance in the treatment of various diseased conditions. But at no time has its value been appreciated as it is to-day. The large number of articles on this subject published in the last few years proves this statement.

The nourishing of a patient is a part of the treatment of the diseased condition, and must always be regarded an integral part thereof and inseparable therefrom. It must, therefore, follow certain rules, and be of such a nature as to act favorably on the course of the disease, or at least to relieve in a measure certain symptoms. In other words, dietetics must assist whatever other therapeutic measures are employed. Very often, it is true, a proper diet will be sufficient to effect a cure. And this fact again proves that the art of medicine cannot do without dietetics.

In order that a diet should prove of value, both the nature of the disease and the individual himself must be considered. It would be a grave mistake to prescribe the same diet for all cases of pneumonia, or another for all cases of typhoid; the individuality of the particular patient must be regarded. As the author has said, the diet must support the other therapeutic measures. For example, in a case of vomiting and diarrhœa, where the chief object is to combat the acute inflammation of the gastric and intestinal mucous membranes, and thus relieve the severe symptoms, the diet must exclude anything and everything that might irritate the diseased membranes; and, on the other hand, should consist of articles which serve to check the inflammatory process—*e.g.*, small bits of ice and ice-water in small quantities. In inflammatory diseases of the brain and of the meninges it is necessary to exclude everything that might irritate the diseased organs; thus we would exclude bright light, loud noises, etc. Our dietary, in order to support this plan of treatment, would naturally exclude all irritating articles, such as spirituous liquors, tea, coffee, etc.

---

* *Zeitschr. f. Krankenpflege.* Translated for the *American Med. Surg. Jour.*

Of equal importance to the nature of the disease is the consideration of the individual himself. And in this regard the patient's powers of digestion demand attention. For the only nourishment which is of value to the patient is that which he digests; and this is true, irrespective of the nature of the disease; and, secondly, experience teaches us that particles of undigested food are more apt to irritate the sick than those in health. Then, again, the powers of digestion are not equally good in all patients, even in the same disease. Thus there are typhoid cases who digest fairly well, and others who are unable to digest the simplest kinds of food. It therefore clearly becomes the duty of the physician to study every case individually in this regard.

The age of the patient must also be taken into consideration. Thus, for example, we know that children are very sensitive to alcoholic stimulants, and, again, that they are far less apt to die of heart failure than adults.

The general nutritive condition, as well as the constitution of the patient, must be regarded. A man who has been in perfect health up to the time he enters upon a siege of disease, is equipped with a certain amount of strength and vitality, which cannot be placed to the credit of him who has lived on a sparse diet, or has suffered from loss of blood and strength from various causes. In this latter case it would be wrong to order a diet poor in nutritive principles, no matter what the nature of the disease might be.

The last point which the author lays stress upon is habit. He says it is not advisable to have the patient take his meals at different hours from those at which he is accustomed to eat, for it has been proved that the functions of the digestive organs are markedly influenced by the accustomed hours for meals. Nor should we exclude coffee or tea in cases where the persons have become accustomed to their effect, unless they are directly contra-indicated. He also admonishes the exercise of care in forbidding the use of alcoholic stimulants in persons who take liquors generally. In regard to the choice of foods, we must consider the habits of the patient. There are food-stuffs which some individuals, by dint of accustomed taking, are able to digest quite readily; whereas the same articles of diet would cause in others considerable discomfort. Particularly in arranging the diet for chronic gastric catarrh is it of importance to inquire what food-stuffs are easily borne. And in this respect, as a rule at least, the patient's word should not be credited very much. The personal observation of the physician will insure more truthful answers.

In making out a dietary, then, it becomes the duty of the physician to individualize, in order to get the best results. To order a routine diet in all cases would be unjust toward the patient.

Now, although, as we have seen, it is necessary to consider the idiosyncrasies of each case, we are still able to formulate certain fundamental principles to govern the diet in case of disease. In the first place, it must be remembered that disease brings about an alteration, but not a complete change of the normal functions, and of the normal conditions of metabolism. The patients, therefore, in order to live and overcome the disease, require the same nutritious substances as the healthy—namely, albumin, fat, carbohydrates, water, and salts. It is only the quantity and the relative proportion of each that must be determined in disease. These depend on the indications.

For the majority of patients the diet should consist of bland and easily digested foods. For this reason we exclude, in general, the coarse, fatty, sour, and strongly seasoned food-stuffs, as well as those containing fibres.

As a rule, it is best to give smaller meals, giving them at shorter intervals. The temperature of the food should be about that of blood-heat, being cooler, even cold, in fevers and in irritability of the stomach, and hot where we desire to excite.

Department of Hygiene.

WITH SPECIAL REFERENCE TO STATE AND PREVENTIVE MEDICINE.

Edited by E. O. SHAKESPEARE, M.D., PH.D.,

(PHILADELPHIA.)

PRIVATE HOSPITALS FOR INFECTIOUS DISEASES.

IN the management of infectious diseases in the best interests of the public health, perhaps no circumstance has more hampered the efforts to limit the spread of infections than the absence of hospitals for the sequestration and skilful treatment of infectious or contagious diseases, other than the so-called pest-houses supported and controlled by the municipality.

While the public hospitals of this class are necessary and perform a very useful function, especially as to the proper care of infectious outbreaks among the overcrowded or dirty homes of the poor, unless the facilities of the municipal hospitals for infectious diseases be supplemented by other hospitals maintained and controlled in other ways the difficulties of checking the diffusion of contagions and infections among the populace are bound to be great if not indeed at times insuperable.

It is not generally known but it is nevertheless the truth that at least forty per cent. of the deaths annually are caused by the preventable diseases. Of these a very large number belong to the infectious or contagious class. And of the people who suffer from this class of diseases it is by no means chiefly the indigent.

To take an indigent patient suffering with a contagious disease from his home and place him in a municipal hospital for isolation, nursing, and treatment is in the great majority of instances to remove him from exceedingly deleterious surroundings and place him under far more favorable conditions. If we consider only his own interests this is usually the best thing to be done for him; and if we view the greater interests of his immediate associates and the much broader interests of his neighbors and the general public, it is unquestionably the wisest thing to be done with such a patient. But our municipal hospitals for infectious diseases have a capacity quite insufficient for the care of patients from the indigent or very poor classes were they to admit none from the classes above them. Moreover, there is a deep-rooted and unconquerable repugnance on the part of nearly every American to become an inmate of a free hospital that savors at all of the air of charity.

It seems obvious enough without pursuing this line of the subject further, that there is urgent need for hospitals for the reception of infectious and contagious diseases, other than those supported and controlled by the municipal government. It goes without saying that general hospitals cannot open their doors for the admission of that kind of patients; to do so were suicidal, even if the health authorities would permit it. We sometimes see sensational announcements in the public press of the inhumanity of the managers and physicians of this or that hospital from whose portals a poor sufferer from infectious disease has been pitilessly turned away. To admit such patients were to inhumanly and pitilessly expose the hundreds of sufferers already within their walls to a truly barbarous, because wilful, multiplication of their sufferings and dangers.

There is many and many an intelligent patient suffering an attack of infectious or contagious disease, in easy circumstances, who would much prefer to be nursed and treated in the private rooms of some pay hospital rather than be cared for at home while subjecting the other inmates of his household to the dangers and inconveniences of an attempted sequestration under his own roof. And there is many a family living in ease and comfort which would be far better satisfied to provide for the proper care and treatment of one of its members, suffering with a disease dangerous to the others, in a pay hospital properly conducted, rather than undertake the dangerous task of isolation and proper attention at home. Besides, it is probable that there are few right-minded family physicians who would not recognize in the pay hospital for infectious diseases a way out of the difficulties which so constantly beset them while in attendance upon cases of infectious or contagious disease in a private home. The pay hospital for infectious diseases would be a godsend to the family physician, we are inclined to think, especially if it were so regulated that he himself could still exercise a supervision over, if not actually treat, his patients sequestered there.

The question of the pay hosptal for infectious disease is a most important one to the general public and to the health authorities. Certainly nothing could be done at the present moment which would so effectively strengthen the hand of the local health officer in his exceedingly difficult task of managing outbursts of infectious or contagious diseases within his district as the provision of proper pay hospitals for infectious diseases.

Will not the friends of public health bring this humanitarian and practical subject to the favorable consideration of our many citizens of wealth and public spirit? It seems to us that there is no better or more lasting monument which a man or a family could erect to the perpetuation of their memory than the founding and endowment of just such a hospital. Certainly he could do nothing more immediately practical for the curtailment of morbidity and mortality by preventable disease.

PHILADELPHIA RECALCITRANT.

NEARLY a year ago the Bureau of Health of Philadelphia successfully petitioned the city councils for the authority and the means to establish a division of Pathology and Bacteriology. The new division was organized with the appointment of one of the most distinguished bacteriologists in America as chief, and two other skilled men as his assistants. The *personnel* of the new division was completed by the appointment of a clerk and two janitors.

The salaries, fixed by authority of the mayor in consultation with the Bureau of Health, were fair and commensurate with the responsibility, skill, and service attaching to the respective positions in the bacteriological laboratory; a sufficient sum of money was still available for the proper equipment and work of this most important branch of the health establishment of the city during the fiscal year of 1895.

The object in establishing this municipal laboratory of preventive medicine was chiefly twofold: 1st, to furnish the physicians of the city the means of more promptly and surely diagnosing diphtheria and tuberculosis in the early stages of these diseases, and to furnish a constant, reliable supply of diphtheria antitoxin for treatment of patients in the municipal hospital, available also for the general practitioners in cases of necessity; 2d, to encourage and conduct on the part of the Board of Health original researches looking to an improved status of hygiene and preventive medicine. It was wisely determined that the great city of Philadelphia should not neglect these most important means of bettering the sanitary condition of her citizens or remain behind New York and other great cities of the world in a movement which is, at the same time, humanitarian and highly economic. In the establishment of this new division of the bureau of health upon a generous and comprehensive basis, the friends of public health recognized a promise of great things for the future of the noble cause in Philadelphia.

The manner of choosing the *personnel* of this laboratory and the amount of money made available for operating expenses promised most effective performances. The selection of the specialists to conduct the work of the laboratory was from the very beginning placed absolutely beyond the reach of politics. A special examining board to pass upon the qualifications of candidates was created, which was not only thoroughly competent to ascertain and weigh them, but was absolutely independent and uncontrollable. The mayor assured this board before they accepted their commissions that only those candidates would be appointed whom the examination showed to be fit. And the mayor fulfilled his promise. All this is a credit to the municipal government of the city of Philadelphia.

But the bane of municipal politics seems to have entered into the operations of this new bacteriological laboratory even during the second fiscal year of its existence, to hamper or even paralyze its usefulness, certainly its energy. The city councils have refused to grant more than the pitiable sum of two hundred and fifty dollars for the working expenses of this new laboratory during the current fiscal year. This is one more of the many outrages which the cause of public health in Philadelphia has been made to suffer at the hands of city councils under the pernicious dictation of the city bosses.

SAND-BED FILTRATION FOR PUBLIC WATER-SUPPLIES.

We reprint in this issue of the Gazette two abstracts of reports upon the practical working of sand-bed and mechanical filters for the purification and clarification of public water-supplies.

These practical tests of various forms of sand-bed filters for public water-supplies, running over months of service, subject to constant and close observation (chemic and biologic) of the manner in which they have functioned, afford two more incontestable proofs of the efficiency and reliability of large filters constructed upon this principle for purifying public supplies. *Sed qui bono?*

Why do municipalities waste valuable time and money in attempting these merely experimental plants? Are their public officials as ignorant of what is going on in the world at large as are the benighted but supremely self-contained celestials of the far East? Have they yet to learn that scores of large cities in Europe, many in India, and some even in Japan have years ago made these experimental tests, and quickly followed them up by wise introduction of the system of wholesale filtration of their general water-supplies by means of broad, thick sand-beds? These Rip Van Winkles appear to be quite oblivious of what has been done in a practical way elsewhere during the last twenty years for the purification of public water-supplies which were originally and essentially bad. They must fiddle and potter with this long-settled matter of the sand-beds, as if it were astonishingly new—like the Roentgen ether vibrations—only yesterday launched spick and span from the laboratories.

Is muddy or contaminated river-water any different in America from that in Europe, India, and Japan? Or do we expect to find our Columbian sand different from theirs? Let us drop this twaddle and fiddling about things which have already had a deal more of experimental and practical demonstration through the efficient purification, for decades, of the public water-supplies of six great cities of the eastern hemisphere, having an aggregate population of 9,100,000 souls, than such experimental plants as those now in use in America, and contemplated here, could possibly furnish in a hundred years. It is no credit to Americanism that we do not recognize our blindness and ignorance upon this long-settled question. And we might also say in passing, that such authoritative scientific bodies as the widely-known Franklin Institute of Philadelphia contribute little towards clarifying the muddy stream of American ignorance in this matter when they invite to their lecture platforms men so densely ignorant of the fundamentals of their theme that they hesitate not to broadly condemn the use of the sand-filter for public water-supplies, on the ground that it is capable of removing *only fifty per cent. of the bacteria which are suspended in the affluent water.* The merest tyro in modern demography and bacteriology should know that some accident has happened to a properly constructed sand-filter bed for public service if it does not, when properly managed, remove from the water which passes through it *ninety-eight per cent.* of the bacteria in the affluent water.

To remove by sand-bed filtration 98 per cent. of all the germs suspended in the public water-supply means not only the complete clarification of the water, but what is far more for the public health, the conversion of an infected stream into wholesome and potable water. Of the swarms of bacteria constantly floating in river-water, 98 per cent. of them may be said to be harmless to health. Experience has shown to be incapable of causing trouble the extremely few germs of disease which may pass through a properly functioning sand-filter bed. The history of the water-borne diseases in the cities of the world which have for years utilized the sand-filter beds for the purification of their public water-supplies furnishes a complete demonstration of this fact. In these cities the mortality statistics as to the water-borne diseases stand in most striking contrast for the periods prior and subsequent to general introduction of the system of sand-bed filtration for their public water-supply.

Legislation against the contamination of American rivers is wise and prudential ; so also is effort to obtain for our cities pure sources of potable water by constructing lengthy and very expensive conduits. But it surely is an extravagant waste of energy and money to continue or multiply the construction of experimental filtering plants, utterly ignoring the entirely satisfactory experiments and experiences of numerous great cities of the world. Let us lend our efforts, without more ado, to the establishment of an adequate sand filtration plant for each American city which has a contaminable water-supply. Thus will the public health experience an immense gain, which will be prompt and lasting.

TUBERCULOUS MEAT AND MILK.

Special Inquiries for the Royal Commission on Tuberculosis by Dr. Sidney Martin on the Infectivity of Food of Tuberculous Origin, and by Dr. Sims Woodhead on the Effects of Cooking Processes.

INFECTIVITY OF FOOD OF TUBERCULOUS ORIGIN.

Brief reference was made in the *British Medical Journal* of January 25 to the publication of the minute of evidence given before the Royal Commission appointed to inquire into the effect of food derived from tuberculous animals on human health, and also of an appendix containing a report of special inquiries. Dr. Sidney Martin undertook an inquiry into the infectivity to the lower animals of food of tuberculous origin.

Meat.—From the result of observations made on twenty-one cows, Dr. Martin concluded that the infectivity of meat does not depend on any infective material present in the muscular tissue itself, but on contamination of the meat during dressing of the carcass of a tuberculous animal, or during its removal from the carcass, by means of the knife, cloth, etc., which has become infected with tuberculous material. He is of opinion that tuberculous kidneys, tuberculous lumbar, pelvic, or popliteal lymphatic glands being evidence that the disease is becoming generalized, should lead to the condemnation of the carcass.

Milk.—With regard to the influence of the extent of the disease in the cow on the infectivity of the milk, Dr. Martin found that this was governed entirely by the question whether the udder were or were not affected. When the tuberculosis of the cow affects only the internal organs, and not the udder, the milk is not infected, but in all cases in which the udder is tuberculous the milk becomes infective, and is, indeed, often extremely virulent. Moreover, the butter, buttermilk, and skimmed milk obtained from this class of milk is also extremely defective. There is no question, therefore, Dr. Martin adds, that "this class of milk ought not to be used as food; and it is indeed certain that its exclusion would lead to a great diminution in the large number of cases of tuberculosis that occur in children."

The Virulence of Tuberculous Milk.—Dr. Martin points out that the milk of cows possesses a virulence which must be described as extraordinary, and very much in excess of that shown to belong to meat. In the case of the meat of tuberculous cows only a very small proportion of the inoculation experiments were positive, and all the feeding experiments with the meat of mild and moderate cases of tuberculosis were negative. In the case of milk from cows with tuberculosis of the udder all the inoculation experiments were positive, and the greater proportion of feeding (19 out of 27 animals fed). He therefore holds that the only conclusion to be drawn from these experiments is that the milk of cows with tuberculosis of the udder ought not to be allowed to be consumed, and that such cows ought to be removed from all dairies and slaughtered.

Diagnosis of Udder Disease.—Dr. Sidney Martin points out the difficulty of making a positive diagnosis as to the nature of an infection of the udder suspected to be tuberculous. To this point we hope to recur on a future occasion when discussing the subject of the diagnosis of tuberculous disease in cows. But we may quote Dr. Martin's opinion that the milk of all cows with tuberculosis of the udder is unfit for human consumption, and therefore the milk of all such cows should be prevented from being used, either as an article of diet or for the manufacture of butter and other milk products. "The matter," he adds, "admits of no compromise whatever. The milk under consideration is so virulent an infective agent that the removal of the cows giving it from dairies is absolutely necessary." To attain the desired end, Dr. Martin lays down that milk obtained from cows with disease of the udder should be excluded from use, and further defines the position by stating (1) that the milk from all cows in which one or more quarters of the udder are enlarged or nodular should be excluded, and that, further, the milk from all cows in which it is evident that the milk from one or more quarters of the udder fails either in quantity or quality should be rejected. He would leave the determination of the difficult question whether the udder disease was tuberculous or not to be decided after subsequent examination by experts. Further, he points out that, though the presence of tuberculosis of the internal organs does not render the milk infective, yet tuberculosis may develop in the udder at any stage of the general disease. Every tuberculous cow giving milk should therefore be looked upon with suspicion, and regular systematic examinations should be made of the udders of such cows if the safer course of excluding from the dairy all cows with advancing tuberculosis is not adopted.

THE EFFECTS OF COOKING.

The investigation into the ordinary cooking processes and of the infectivity of meat and milk from tuberculous animals was undertaken by Dr. Sims Woodhead, who expresses his special obligation to Dr. Cartwright Wood for his assistance in the elaborate series of researches which it was necessary to undertake.

Meat.—Dr. Woodhead points out that the special danger with regard to meat is that in the process of the preparation of joints by the butcher the surface may become smeared with tuberculous matter from diseased glands; such matter may be carried by the hands of the butcher or by his knife. He points out further that the danger arises in particular with rolls of meat. He states that in the boiling and roasting experiments, as ordinarily carried out in the kitchen, the temperature, however high it may be near the surface, seldom reaches 60° C. (140° F.) in the centre of a joint, except in the case of joints under six lbs. in weight. Ordinary cooking is quite sufficient to destroy any smeared material that remains on the outer surface of meat, but it cannot be relied upon in the slightest degree to render innocuous the same smeared material when in the centre of a roll. As these rolls are always subject to a good deal of handling and cutting during the process of making up, they are correspondingly more liable to contain such smeared material than ordinary joints, and the risk of their carrying infection is to that extent increased. It is added that the least reliable method of cooking is roasting before the fire; roasting in an oven is more effectual, and boiling still better.

Milk.—From his experiments Dr. Woodhead concludes that milk from tuberculous udders is in all cases possessed of the power of setting up tuberculous infection, even when mixed with a considerable quantity of sound milk. Heated tuberculous milk gradually loses its virulence as the temperature is raised and the time during which the milk is exposed to it prolonged. It was found that the exposure of even virulent tuberculous milk to a temperature of 85° C. (183° F.) for five minutes is sufficient to render it innocuous, although the same material brought rapidily to a temperature of 90° C. (194° F.) still retains some power of infection.

The "Scalding" of Milk.—Experiments were made as to the effect of the ordinary process of "scalding" milk, in which the milk in an earthenware jar or tin pan is placed in another pan containing a quantity of water, which is then brought to the boiling point. It was found that under these circumstances the temperature of the milk of the upper part rose much more rapidly than that of the lower part. In one experiment, after the milk had been on the fire for fourteen minutes, the temperature at the top was 71.1° C. (160° F.), while at the bottom it was 56° C. (133° F.); at the end of twenty-six minutes the temperature at the top was 92° C. (198° F.), at the bottom 83.5° C. (182° F.). In another experiment with a stronger flame these differences were less marked. These experiments clearly proved that the mere scalding of milk by bringing the outside water up to a boiling point was quite inadequate to sterilize tuberculous milk.

Domestic Sterilization of Milk.—Dr. Woodhead gives the following practical directions for the domestic treatment of milk when it is desired to arrest souring, or when it may be necessary to make use of milk from an unknown or suspicious source: "(1) The quantity of milk should never be more than the quantity of cold water by which it is surrounded; it is an advantage, in fact, to have a somewhat larger bulk of water than of milk, to allow for evaporation. (2) The milk should not be covered in, and should be stirred from time to time, but the water may with advantage be covered, in order to prevent evaporation; this, of course, is arranged for in special milk sterilizing pans. (3) The water should be boiled over a good brisk flame, in order that the best results may be obtained, and the heating process should be continued until the temperature throughout the milk has risen from 88° C. (190° F.) to 92° C. (198° F.); in most cases this takes place at the end of about twenty-five minutes, but in order to be perfectly safe it may be recommended that every quart of milk treated in this fashion should be heated for half an hour, that is, for about twenty minutes after the water in the outer pan has begun to boil."—*Brit. Med. Jour.*

ASEPSIS AND ANTISEPSIS IN OTOLOGY.

By J. Holinger, M.D.,
CHICAGO.

The application of the principles of asepsis in all their details has brought great progress in general surgery, in hygiene, and in the particular branches of gynecology, obstetrics, and ophthalmology; but in some other departments of medicine much is still to be done, before the ideal condition desired by the friends of asepsis will have been attained. Among these latter it seems to me that otology must be included, and that as regards it the greatest number of scientists underrate the value and misunderstand the necessity for the strictest asepsis. Of course in large operations the instruments are boiled, the patient is cleaned, and as a rule the operator's hands are more or less carefully disinfected. But between this and a complete, consistent, and thorough asepsis there is a wide difference. The principles of asepsis should be carried out in otology in the routine examinations of the ear, and especially in the seemingly unimportant details of ambulatory practice. A little reflection will show that hardly anywhere is strict asepsis of more value than in ambulatory practice. Except in cases of very small children we have to use instruments in every examination, and to use them in parts of the body normally covered by only a very tender epidermis, parts that are not accustomed to nor able to endure irritations and that hence are extremely vulnerable. Furthermore there is no physician who comes so much into contact with putrid and virulently infective material as the otologist. Yet it must be admitted that there are many otologists who do not acknowledge the necessity of asepsis in their department. Their view is not based upon the absence of ill results in their cases, because such results do exist, though they are not always readily recognizable and their recognition demands an experienced eye. Even when recognized, there is often lacking in those who are responsible for them the courage to admit them either in public or in private.

If a confinement case be managed improperly and uncleanly, the evidences of infection will appear within a few days at the very spot where it occurred and a violent form of sickness results. In that case there are hundreds of widely open lymph channels to carry the infection into the blood; but in diseases of the ear the avenue of infection is less apparent and the process is slower, since it takes place through minute openings in the bone. A violence done to any soft part with an infected instrument will show its effects at the very spot within a few days in the form of an acute inflammation, but in otology the place, the time, the manner, and where, when, and how of infection are entirely different from what we expect. This is proved by a few examples. Who would expect an erysipelas of the face to originate in a minute injury made by an unclean Eustachian catheter on the mucous membrane far back in the nose? Yet precisely such cases are not infrequent. Again, it would seem hardly possible that a middle-ear suppuration of twenty years' standing and ending in necrosis, cholesteatoma, deafness, cerebral abscess, and death should have been due to the use twenty years earlier of an unclean ear speculum or probe used by a doctor, or of a hairpin used by a mother in cleaning her baby's ear. Yet such is the origin and history of cases that occur not infrequently in practice. The explanation becomes clear to any one who will follow up the results of bacteriologic examination of aural secretions. It has been established by the independent researches of many investigators that the pus of acute otorrheas contains as a rule only one species of bacilli or cocci and only exceptionally any streptococci; whereas in chronic cases these latter are usually present. In other words, *acute infections of the ear are due to a single species of microörganism and heal quickly; while chronic otorrhea is due to a mixed infection with streptococci.* Hence the force of the old saying: "As soon as you treat (with non-sterilized instruments) an acute suppuration of the ear, it becomes chronic." No more apt vehicle for mixed infection can be conceived than an ear speculum if it is not properly disinfected, for when used in a suppurating ear its lumen is certainly soiled by the pus, and when applied to the next patient's ear the infectious material is carried inward by the probe and cotton. Thus a chronic otitis is generated which insidiously destroys hearing, and perhaps after the lapse of years even imperils the victim's life. Not less frequent is infection of the soft parts of the external meatus through imperceptible and scarcely avoidable excoriations made by unclean specula. Sometimes the whole meatus is filled with pus, and this a careless examiner may press into and massage into the tissues. The infection will manifest itself either in the form of a general inflammation of the auditory canal or in a local furunculosis. It will not endanger life nor will it last for years, but it causes much pain, and by depriving the patient of sleep and appetite may injure him seriously.

Besides these forms of infections which remain localized, unclean aural instrumentation may be also a means of introducing chronic general poisons; such as those of tuberculosis and syphilis. Many otorrheas are tuberculous, and they may be so without there being any other tuberculous affection present in any part of the patient's body. Cases are recorded of general miliary tuberculosis following a tubercular osteitis of the temporal bone. In the case of syphilis, the sequence can be traced out more directly and more surely. A number of cases have been published of syphilitic primary lesions within the nose, and doubtless many more have *not* been published or have *escaped observation.* The statement may seem exaggerated, but I believe that it furnishes an explanation for some obscure cases of syphilis without any visible scar of a primary infection on the whole body.

Some practitioners may shake their heads and smile at these views and go along in their old dirty ways. So did others when Pasteur and Lister published their principles and results. Time will prove the right. Certain I am that when legislation deals fully with the permissible and the criminal acts of physicians, it will devote a chapter to avoidable infections.

Antiseptic solutions, such as carbolic acid, etc., are generally not thorough enough for disinfection. They serve rather to lull our consciences. Therefore I would state the following practical rules for aural work :

1. Every instrument should be so constructed that it can be easily cleaned and examined.

2. Before every examination the instruments (speculum, probe, catheter, middle-ear instruments) should be boiled, and immediately after use they should be washed in cold water, so that the pus, mucus, and blood may not coagulate and dry on them. Of course, it goes without saying that the hands must be kept clean according to the general rules of asepsis.

A recent article mentions a handy way of sterilizing the cotton. After being attached to the probe it is dipped into an alcoholic solution of boric acid, and then held in a flame till the alcohol is burned out, the boric acid preserving the cotton from burning.

The carrying out of these principles involves much trouble, time, and expense, but they should not be spared in private and especially in *dispensary practice*, where so many cases, chronic, acute, specific, etc., pass through a rapid examination. The benefit may not be expressed in numbers, but it exists and is worth attaining.—*Jour. Am. Med. Assn.*

BACTERIOLOGICAL RESULTS FROM MECHANICAL FILTRATION.

By Gardner T. Swarts, M. D.,
PROVIDENCE, R. I., SECRETARY OF STATE BOARD OF HEALTH, RHODE ISLAND.

At the last meeting of this association at Montreal the statement was made in the report of the committee on water-supplies that no data had been available to show that filtration by the so-called mechanical methods was successful in removing bacteria. The writer at that time referred to experiments which had been made in the city of Providence, Rhode Island, in order to determine this question for the purpose of establishing a plant capable of filtering 15,000,000 gallons daily if the experiments were successful.

The figures showing these results were not at that time available, and as they have never been published and as no experiments of a similar character have been made, it seems desirable to place these facts before the association, inasmuch as many municipalities are agitated over the advisability of introducing the so-called natural or sand-bed filtration or mechanical filtration.

The mechanical form of filter used in the experiments was of the type in which quartz or sand is used as a supporting bed to a film of precipitated coagulant or fixative of organic matter, produced by the introduction into the water, before filtering, of some chemical such as iron or alum ; a filter which is also cleansed by means of a reversed current of the water passed through the filter assisted by the use of a rake made to revolve in the bed of the quartz while the washing is being done.

The filters used in this line of experiments were two of the natural sand-bed form imitating the usual filter bed. The mechanical form was represented by one of the New York Filter Company's filters and one of the so called Morison filters. After the first seven months the sand filters were discontinued, it having been satisfactorily ascertained that the length of run was much less than the mechanical filter before the bed became clogged, and the rate of flow in the natural bed was but 30,000,000 gallons per acre in twenty-four hours, while the mechanical filter was run at the rate of 125,000,000 gallons per acre in twenty-four hours. The efficiency of removal of bacteria was not as high, and the results variable, either as the result of cracks in the filter or from some unknown reason. Although both of these natural filtration beds were constructed exactly alike, the results from the second were much poorer than the first. When the natural bed was transformed or assisted by the addition of alum, thus converting it into a mechanical filter, the removal of bacteria was increased to nearly the same as on the Morison filter, but the length of the run was correspondingly decreased.

The sand used in the natural beds was a natural river sand, not over sharp, while the sand used in the mechanical filter was crushed quartz having sharp edges.

In the beginning of the experiments the New York filter gave such varied and unreliable results that its use was abandoned, while the so-called Morison filter was continued in use during the whole series of experiments, which lasted for a period of about ten months, the working of the mechanical parts of the filter being perfectly satisfactory and the results obtained being successful.

The filter bed used in the mechanical filter was two feet ten inches in depth, supported upon a base of iron with circular perforations of about four inches in size, which were covered with screens. The crushed quartz used was the "effective size" of 0.59 millimetres. The filter was washed by a reverse current which caused the quartz to boil. The agitation and friction of the particles were increased by means of a rake with long teeth which revolved about a central column in the filter, the rake penetrating the bed by a screw motion from top to bottom.

From the various kinds of coagulant or precipitant used basic sulphate of alumina was selected as being the most satisfactory and effective and was used in all the experiments mentioned. The amount of alumina used was ½ grain to the gallon of water filtered, a lesser quantity failing to satisfactorily remove the organisms, while the amount of three-fourths or one grain per gallon did not increase the removal of the bacteria, while the efficiency of the filter was greatly decreased by reducing the amount of the flow through the filter bed.

The alumina was applied in a free flow at the beginning of a run by pouring into the filter, as the water entered, a pint of the coagulant containing about 911 grains of sulphate of alumina for an average flow of 128,000,000 gallons per acre. The solution was made by adding one part of the alumina to six parts of water; as a result of this addition there forms a white flocculent precipitate over the surface of the grains of quartz and is the actual medium through which the filtration takes place, the quartz serving merely as a supporting bed or sieve. It required about six minutes to form this layer. When applied at the rate of a drop at a time and not in a "free flow," it required about a half an hour before the filtering layer would be formed. As soon as the filtering layer was formed the alum solution was dropped in continuously during the run from a regular stop at the rate of a drop a second. The effect of the presence of this layer was to reduce the head or pressure .28 of a foot for 128,000,000 gallons per acre. The depth of the water above the bed at the commencement of the run was nine inches; the average length of the run was about eighteen hours.

Under these conditions it was determined how long, after the commencement of the run, the filtering ability was at a maximum, and also the capacity of the filtering media to remove organisms, and also the possibility of removing organisms foreign to river-water and simulating pathogenic bacteria in their life history. In this last experiment the Cruikshank bacillus and the bacillus prodigiosus were used, since from their pathogenic properties they could be readily distinguished from the water bacteria.

For an understanding of the proportion of bacteria found in the applied water and the number to be found in the filter water Table No. 3 of the report is here appended.

As a result of the whole series of experiments the totals shown in Table No. 9 will give an idea of the averages. In consideration of this table it must be remembered that the introduction of only one result, which may be far below the average, will readily reduce what would otherwise be a most favorable average to a lower point. This one result might occur from a temporary contamination of the effluent pipes at the time of collecting the sample, and which might not represent the exact results of filtration.

TABLE NO. 3.—FILTRATION EXPERIMENTS.—MORISON'S FILTER.

Growth of about ninety hours, of water bacteria in the sample of applied and filtered water, which were taken at the same hour; which was one hour or more after the water commenced to flow from the filter.

Date.	Gallons of Water Filtered per acre per Twenty-four Hours.	Bacteria per Cubic Centimetre. In Applied Water.	Bacteria per Cubic Centimetre. In Filtered Water.	Per Cent. of the Applied Bacteria Removed.	Average Percentage of the Applied Bacteria Removed.	Grains of Sulphate of Alumina Added.
1893. July						
20	125.000,000	2,000	11	99.5		0.75
21	122,000,000	9,477	16	99.8		0.90
Oct.						
3	125,000,000	905	6	99.3		0.60
4	128,000,000	610	2	99.7		0.58
5	131,000,000	4,002	25	99.4	99.5 (By totals, 99.6)	0.55
17	125 000,000	6,175	26	99.6		0.57
27	122.000,000	9,700	41	99.6		0.61
30	128,000,000	1,700	7	99.6		0.56
31	131,000,000	400	9	97.8		0.59
Nov.						
1	132,000,000	15,112	19	99.9		0.61
2	123,000,000	6,950	26	99.6		0.81
3	122,000,000	9,400	50	99.5		0.84
4	132,000,000	3,400	63	98.1		1.20
9	125,000,000	2,200	26	98.8		0.60
11	125,000,000	3,650	25	99.3	99.2 (By totals, 99.5)	0.82

COMMENCED TO USE THE BACILLUS PRODIGIOSUS.

Date.	Gallons of Water Filtered per acre per Twenty-four Hours.	Bacteria per Cubic Centimetre. In Applied Water.	Bacteria per Cubic Centimetre. In Filtered Water.	Per Cent. of the Applied Bacteria Removed.	Average Percentage of the Applied Bacteria Removed.	Grains of Sulphate of Alumina Added.
Nov.						
23	120,000,000	15,850	218	98.6		0.60
24	132,000,000	7,600	364	95.2		0.59
Dec.						
2	128,000,000	4,900	190	96.1		0.75
4	128,000,000	4,475	91	98.0		0.60
1894 Jan.						
2	132,000,000	2,150	94	95.6		0.85
3	137,000,000	2,000	118	94.1		0.84
4	134,000,000	2,275	44	98.1		0.85
5	130,000,000	1,925	60	96.9		0.82
8	130,000,000	2,375	184	92.3	96.1 (By totals, 96.9)	0.58

CEASED TO USE BACILLUS PRODIGIOSUS.

Date.	Gallons of Water Filtered per acre per Twenty-four Hours.	Bacteria per Cubic Centimetre. In Applied Water.	Bacteria per Cubic Centimetre. In Filtered Water.	Per Cent. of the Applied Bacteria Removed.	Average Percentage of the Applied Bacteria Removed.	Grains of Sulphate of Alumina Added.
Jan.						
9	130,000,000	1,850	54	97.1		0.60
10	134,000,000	800	28	96.5		0.84
11	130,000,000	750	20	97.3		0.61
12	132,000,000	350	52	85.1		0.81
13	132,000,000	600	36	94.0		0.72
15	134,000,000	925	88	90.5		0.84
16	134,000,000	375	44	88.3		0.58
17	130,000,000	2,150	64	97.0		0.82
18	134,000,000	1,500	62	95 9		0.54
19	136,000,000	1,450	80	94.5		0.83
20	130,000,000	2,800	58	97.9		0.72
22	132,000,000	3,350	62	98.1		0.85
23	132,000,000	2,300	64	97.2	94.6 (By totals, 96.3)	0.80

WASHED FILTER BED WITH CAUSTIC SODA.

Date.	Gallons of Water Filtered per acre per Twenty-four Hours.	Bacteria per Cubic Centimetre. In Applied Water.	Bacteria per Cubic Centimetre. In Filtered Water.	Per Cent. of the Applied Bacteria Removed.	Average Percentage of the Applied Bacteria Removed.	Grains of Sulphate of Alumina Added.
Jan.						
24	128,000,000	2,100	6	99 7		0.60
25	125,000,000	2,225	18	99 2		0 82
26	128.000,000	4,650	54	98.8		0 58
27	128,000,000	4,875	72	98.5		0.58
29	128,000,000	1,575	82	94.8		0.59
30	130,000.000	1.400	28	98.0	98.2 (By totals, 98.5)	0.58

During the application of the cultures of bacillus prodigiosus in large quantities suspended in the nutrient media, the numbers of the common water bacteria materially increased in the effluent, the particles of quartz becoming covered with a slimy brownish deposit. Unsuccessful efforts were made to cleanse the quartz of this growth by steaming and boiling the quartz for one hour. Finally on the application of a solution of one pint of caustic soda to twenty-four parts of water and steaming, the normal white color of the quartz returned. The efficiency of the filter was raised by this process of cleansing from 92.8 per cent. to 98.8 per cent. As to the mooted danger attending the use of alum in the applied water and which is held up as a warning by the opponents of mechanical filtration, this much may be said in reference to this series of experiments:

While it was necessary to add half a grain of sulphate of alumina per gallon of water filtered in order to obtain the most satisfactory results, yet upon comparison by the most careful chemical tests of the water applied to the filter and that of the effluent, there was found to be less alum in the filtered water than in the river-water itself.

Inquiry from numerous manufacturers using alum as precipitant in various quantities in excess of the amount used in the experiments revealed in no instance any incrustation or scaling in the boilers where such filtered water had been used. Communications with the various boiler insurance companies elicited no report of scaling where such water was used. There is no recorded instance where alum-treated water as a drinking-water has produced any ill-effects upon the consumers.

This work was done by order of the city council of the city of Providence and under the direction of a commission consisting of the Superintendent of Health, the City Engineer, and the Commissioner of Public Works. The immediate supervision of the operation was under the supervision of Dr. C. V. Chapin, the Superintendent of Health and a member of this association, while the application of the various tests was made under the direction of Mr. Edmund D. Weston, C.E., from whose compilations and reports these abstracts have been taken. Most of the bacteriologic work was done by the writer.

Inasmuch as the writer, as well as every person connected with the experiments, commenced the investigation with the firm belief that successful mechanical filtration was not possible from a bacteriologic view, it must be stated now, after examination of these figures, that mechanical filtration under these conditions can be firmly endorsed.—*Jour. Am. Med. Assn.*

EXPERIMENTAL SAND FILTRATION OF WATER IN PITTSBURG.

THERE is a general prejudice against household filters, on the ground that they rarely receive the attention which their safe use demands. The prejudice is in some degree well founded, but it should not be extended to city filters, where water is purified by slow and careful sand filtration with all necessary supervision. Sand filters are common in Europe and are likely to be soon adopted by all American cities which now use contaminated river-water and are suffering the usual penalty for so doing, viz.: excessive typhoid fever mortality.

The Craig Street filter of the Citizens' League is an experiment to test the adaptability of the European method to our local conditions. The city water of Pittsburg is being continuously filtered, at the rate of 2,500,000 gallons per acre per day, through four feet six inches of common washed Allegheny river-sand, in a manner which may be seen by any one who cares to visit the plant. (Craig Street, near Fifth Avenue, Bellefield.)

Since October 28, 1895, the sand having at that time settled together thoroughly, the filtered water has been of a uniformly satisfactory character, with the exception of a brief interval following the November 12 scraping (when half an inch of sand was removed to prevent continued clogging).

Bacteriologic tests of the filtered and unfiltered water have been made almost every day since September 22, when the filter was started. Two chemic analyses have been made. A few results follow:

		Per cent. of bacteria removed by filter.
September	23	none.
"	25	27 per cent.
"	27	46 " "
October	4	69 " "
"	12	89 " "

Soon after this the percentage of bacteria removed by the filter reached and exceeded 99 per cent. It remained approximately the same until the scraping.

I now give for comparison the bacteriologic analyses following the scraping of the filter on November 12. It is generally supposed that the efficiency of a filter is very much impaired by the cleaning process and that no good work is done until the "Schmutzdecke" is restored. Our experience seems to indicate that good results are obtained in a few hours (93 to 94 per cent. removal) and that the efficiency soon returns to the normal.

		Raw water. Bacteria per c.c.	Filtered water. Bacteria per c c.
November	12[*]	...	..
"	13[†]	505	13
"	14	778	30
"	15	1156	64
"	16	782	56
"	18	946	8
"	19	424	8
"	20	196	8
"	21	612	6
"	23	232	7
"	25	350	8
"	26	176	4
"	29	1414	10
"	30	not counted	7

The removal for a few days (November 13 to 16) amounted to 95 per cent. (average). The removal for the next nine days averaged 98.66 per cent.

CHEMIC ANALYSIS.

October 31, 1895.	Raw. Parts per 100,000	Filtered. Parts per 100,000	Percentage removed by filtration.
Free ammonia	.00093	.00026	72 per ct.
Albuminoid ammonia	.00620	.00180	71 per ct.

Aside from the chemic and bacteriologic improvements which filtration effects, it is also interesting to note that the filtered water is superior to the raw in the following respects:

Odor, taste, suspended matter, and most of the dissolved coloring matters are removed by the filter. When the filter is at its best, the effluent resembles distilled water and is even more palatable. At present, although the bacteria are being satisfactorily removed, the water has a slight brown color and a very faint opalescence, but is without odor or taste. The raw water just now is very brown, from dissolved vegetable matter, and very muddy also. At the present rate of filtration, the interval between scrapings seems to be about seven weeks.

The experiment thus far has been very encouraging. Our available river-sand is suitable for city filtration, and it is to be hoped that it will soon be so used. The experiment will be continued for the purpose of testing different rates of filtration, and the intermittent as well as the continuous system.

Additional financial aid for this enterprise will be greatly appreciated.—*James Otis Handy, in Pittsburg Medical Review.*

---

[*] Filter scraped; ½ inch sand removed.

[†] Twelve hours after second start.

THE NEW YORK HEALTH BOARD JOINS THE CAMPAIGN AGAINST PUBLIC SPITTING.

On January 18 the New York City Board of Health made public a report of Dr. Herman M. Biggs, pathologist, and Dr T. Mitchell Prudden, consulting pathologist of the Health Department, on the subject of expectoration in public buildings and conveyances. Circulars of information have already been published and distributed by the department, and some bacterial diagnostic work has been done by the bureau under the charge of Dr. Biggs; but the officials feel that the time has come to make another advance. They will recommend that notices be posted in all public places and in all surface and elevated cars in this city, signed by the Board of Health, warning passengers against expectoration upon the floor of those conveyances; and further that similar notices be posted in the stations of the elevated roads, warning people against expectoration upon the platforms and stairs, or on the floors of the stations. The report above referred to says: "It has been for a long time known that the expectoration of persons suffering from laryngeal or pulmonary tuberculosis, pneumonia, influenza or the grip, and from diphtheria, contains the specific germs of these different diseases, and is capable of inducing these diseases in others. There is, furthermore, much evidence that a similar condition exists in certain more readily communicable diseases, such as scarlet fever, measles, and whooping-cough. In regard to some of these affections, the danger from the expectoration in public places is of course small, as the patients are ordinarily confined to their homes during the infectious period. But this is not universally the case. It has long since been shown that the chief means for the transmission of consumption is the dried and pulverized sputum of persons suffering from the disease. These germs are liable to be gathered on the feet and on the skirts of women and taken into private houses, where the most perfect ventilation will not stay their evil effect. Expectorating in public places should be abated, as any other public nuisance which is brought to the attention of this department. That it is a habit and not a necessity is clearly enough shown by the large number of men who are free from it, and the insignificant portion of women who practise it. There seems to be no good reason for the longer sufferance by the mass of people of the carelessness and the negligence of the few. We believe that this is a matter of great importance, and that on this ground alone it demands the interference of your board. We believe that the time has now arrived when the people of the city of New York will heartily support the adoption of such sanitary measures as may seem necessary and expedient for the abatement of this widespread nuisance and source of danger."—*Jour. Am. Med. Assn.*

THE BACTERIOLOGICAL DIAGNOSIS OF TYPHOID FEVER BY ELSNER'S METHOD.

ALTHOUGH typhoid fever is now quite generally accepted as one of the group of microbic maladies, the diagnosis of doubtful cases by bacteriological tests has not yet found its way into every-day practice. The identification of the typhoid bacilli has hitherto been beset with time-robbing difficulties. For this reason physicians have relied on the older methods of clinical diagnosis.

But it now apears that the recent observations of Dr. Elsner (referred to in the *Medical Record* of January 25, 1896) have already received corroborative recognition from other observers.

Dr. Lazarus, of Berlin (*Deutsche medizinal Zeitung*, January 13, 1895), has recorded a number of typical cases of typhoid fever in which the method of Elsner amply confirmed the clinical diagnosis. In every case (with one exception) forty-eight hours sufficed for the growth by culture of typhoid bacilli. Even in convalescent cases bacilli were still found, a point of practical importance, according to the author, as foreshadowing the possibility of relapse. In the single case alluded to, the growth of the microbes was not complete before the end of the third day. Yet in this instance also the final result is a positive one.

The same author also refers to three doubtful cases in which bacterioscopy gave negative results, and in which the subsequent course of the disease showed that enteric fever was out of the question. Lazarus emphasizes the great simplicity of this method, especially as compared with the oftentimes difficult bacteriological diagnosis of cholera.

Prof. L. Brieger, of Berlin, has likewise confirmed the utility of the method of Elsner in eleven cases, published in the *Deutsche medicinische Wochenschrift*, No. 50, 1895. In all his cases the cultures became plainly recognizable in forty-eight hours. The identity of the bacilli was further established by Pfeiffer's test, namely the power of the blood of enteric-fever patients to confer immunity against infection by typhoid bacilli.

We are informed, finally, that Elsner and others are at present utilizing this new method for purposes of study in connection with the distribution of the bacilli in the ground and in water.

This discovery promises well for the future, and we await with interest its more complete development. Perhaps we shall soon be able to diagnose typhoid fever by bacterioscopy with the unerring promptitude that now pertains to the recognition of cholera.—*N. Y. Med. Rec.*

ALKALINITY OF THE BLOOD AND MICROBIC INFECTION.

DR. FODOR records a number of experiments showing the influence of the alkalinity of the blood on diseases produced by microorganisms. Four series of experiments on animals are first reported, which show clearly that, by the administration of alkalies (sodium bicarbonate by the mouth or by subcutaneous injection), the power of resistance against infection with cultures of anthrax bacilli is greatly increased. The normal alkalinity of the blood was determined by the examination of seventy-six healthy rabbits, and four experiments are reported, showing the increase in the alkalinity of the blood which occurs after the administration of sodium bicarbonate. The author then records the results of a large number of observations on the alkalinity of the blood in rabbits after infection with the bacilli of anthrax, cholera, typhoid fever, tuberculosis, and erysipelas. These observations show that in the living organism after infection with certain bacilli, there is first an increase of the alkalinity of the blood and then a diminution of the same, more or less. If the infection is fatal, the diminution of the alkalinity is marked and progressive; if not fatal, the diminution is slight, and is followed by an increase of alkalinity, which then remains high permanently. Thus there exists a connection between the pathological action of certain bacteria and the alkalinity of the blood. Those rabbits having the greater alkalinity of the blood, as well as those in which the alkalinity of the blood is increased to a greater extent after infection, have greater power of resistance against certain infectious organisms (anthrax bacilli) than the rabbits in which the alkalinity of the blood is less. It appears, therefore, that the degree of alkalinity of the blood, as well as the power of the organism to increase this alkalinity with corresponding intensity after infection, is of essential influence upon humanity.—*Brit. Med. Jour.*

THE SERUM TREATMENT OF LEPROSY.

We are indebted to Dr. Pablo Garcia Medina, of Bogotá, the permanent secretary of the National Academy of Medicine of the Republic of Colombia, for a copy of an important communication presented before that learned body on the 22d of last November by Dr. Juan de Dios Carrasquilla L. This communication is supplementary to one presented by the same gentleman before the academy on August 30. Dr. Medina informs us that at the November meeting the academy declared officially that Dr. Carrasquilla was the introducer of the serum treatment into Colombia and the first to prepare and employ an anti-leprous serum. It seems that at the time of the August meeting Dr. Carrasquilla had had occasion to deal only with that variety of lepra Græcorum which is characterized by nervous manifestations. His second communication relates to tubercular leprosy.

Dr. Carrasquilla gives a full account of a case of well-marked tubercular leprosy characterized by leontiasis (the *léprôme en nappe* of Leloir) and the anæsthetic phenomena commonly seen in the disease. Prompt improvement followed the use of the serum treatment, and recovery, save for the persistent marks of the ulcerative features of the disease, ensued in less than a month. Shorter accounts are given of three other cases of tubercular leprosy in which the results of serum treatment were equally satisfactory, and then the author states his conclusions as follows: 1. The serum treatment overcomes the anæsthesia more or less rapidly, in proportion to the extent and gravity of the lesions of the peripheral nerves. 2. It decolorizes the macules without obliterating them entirely; they become the seat of abundant desquamation. 3. It causes œdema to disappear rapidly in some cases, slowly in others; the skin retracts, becomes wrinkled, and finally returns to its normal state when the œdema has subsided. 4. The tubercles become flattened and softened and disappear, either by absorption, by desquamation, or by suppuration, leaving marks to show their situation. 5. After suppurating abundantly, the ulcers heal with marvellous rapidity and leave the skin sound. 6. The scars of old suppurative lepromata become pale and tend to assume a level with the surrounding skin. 7. The ulcerated mucous membranes hasten to cicatrize, become decolorized like the cutaneous macules, and regain their sensibility, while the tubercles disappear. 8. With the disappearance of the œdema and the tubercles and with the fading of the stains the countenance grows thin and loses its leonine aspect entirely. 9. The appetite is recovered, together with the capability of sleeping, there is cheerfulness, content replacing the previous profound depression, and lost hope is regained. 10. From the first serum injection administered to the patient the morbific action of the *Bacillus lepræ* ceases, and no new manifestation of the disease shows itself. This the author has invariably witnessed in the fifteen cases that he has treated. The peripheral nerves are the seat of the disease, he says, and the lesions observed depend on disturbed nervous action; that corrected, they will gradually disappear.

Dr. Carrasquilla closed his communication with the statement that at the next meeting of the academy he would explain his methods of preparing and using the antileprous serum, as well as of avoiding accidents in its employment. We shall look for that final communication with great interest. —*N. Y. Med. Jour.*

FILTHY ICE-CREAMS.

THE report of *The Lancet* Special Commission on the Sanitary Condition of the Italian Quarter, published nearly twenty years ago,* showed under what loathsome conditions ice-creams were made and might have enabled any intelligent person to predict with certainty the exact species of organism which would be found probably in millions in a pennyworth of ice-cream on bacteriological examination. Is it, to take one example, at all surprising that the bacterium coli commune, the constant inhabitant of the human bowel and ever present in sewage matters, is found in ice-creams when we learn from our commissioner's report that the mixture is made in filthy backyards or in dark cellars where it is exposed to foul emanations, gaseous, liquid, and solid, where the floor spaces oftentimes cannot be crossed except by boards, which in some instances sink suddenly into the sludge oozing from a defective drain beneath and splashing the malodorous mixture into any receptacle that may be near? We leave out the very questionable character of the materials employed in making ice-creams; they were bad enough, as our commissioner saw, in some of the houses of the Italian quarters in London. Rotten eggs, bad flour, and repulsive-looking milk, all excellent pabula for the disease germ, are often, it is to be feared, the ingredients of the ice-cream compounder's recipe. The numbing effect of the ice upon the palate coupled with the sweetness of the sugar is an effectual disguise to the disagreeable taste of these ingredients. Bacteriological examinations of ice-creams have been made from time to time and more recently by Dr. Klein, whose report was discussed in *The Lancet* of Oct. 13, 1894. A fresh and a very exhausive inquiry has just been completed by Dr. Macfadyen, of the British Institute of Preventive Medicine, and by Mr. Colwell, F.I.C., which should deal the deathblow to an evil unchecked and secure the prompt assistance of the legislature to place these disease-breeding grounds under the control of the law. The average chemical composition of an ice-cream according to these investigators is as follows: Total solids, 26.5 per cent.; fats, 4 per cent.; sugar, 12 per cent.; starch, 6 per cent.; albuminoids, 4 per cent.; and mineral matter, 0.5 per cent. Microscopical examination revealed the following delectables: Bedbugs, bugs' legs, fleas, straw (bed?), human hair, cat's and dog's hairs, coal-dust, woollen and linen fibre, tobacco, scales of epithelium, and muscular tissue. Could the list be more complete in absolute confirmation of our commissioner's observations on the filthy environment under which they found ice-creams being made? ("The rooms contained as many double beds as could be got into them; there were no washstands, no basins, no towels—nothing but beds with very scanty, filthy, black bedding swarming with vermin."—*Vide The Lancet* Commission, *The Lancet*, Oct. 18, 1879, page 590.) Shop samples were as a rule better as regards their bacterial contents than the street-barrow supplies, the maximum number of organisms found in the former being just over a million per cubic centimetre, and in the latter seven millions. The water used in making the creams teemed with micrococci, bacilli, and spirilla, one sample containing over five million bacteria in one cubic centimetre (about twenty-five drops). Putrefactive microbes were constant inhabitants, and so on *ad nauseam*. The results are too highly disgusting to need further comment, or to require at our hands any other remark on the urgent need for agitation for the immediate interference of public authority in this matter.—*London Lancet.*

---

* *The Lancet*, Oct. 18, 1879, p. 590.

CHOLERA IN EGYPT.

INEFFICIENT NOTIFICATION.—THE EPIDEMIC SMOULDERINGS.—CONTAMINATION OF THE WATER-SUPPLIES; ITS DANGER FOR THE FUTURE.—IMPORTATION OF THE DISEASE INTO CAIRO.—ITS SUPPRESSION.—THE SANITARY DEPARTMENT.

THE total number of cases of cholera recorded up to December 27, 1895, was 1096, with 912 deaths. The majority of cases notified are found in a moribund condition. The slighter cases recover and are never heard of, but are undoubtedly the centres of infection which give rise to the isolated outbreaks which are occurring.

Meanwhile the winter is passing, the Nile is daily becoming lower, the canals must be cleared for the summer irrigation, the pollution of the water-supply becomes simpler, and the possibilities of an outbreak in the summer less remote. Fortunately the disease in the Bahr-el-Saghir, the region principally infected, is practically stamped out. The occurrence of two isolated cases, one of Matarieh, the other in the town of Mansourah, shows that any relaxation of vigilance might be followed by a recrudescence of the disease. The disease still persists in the Damietta region, and on the Nile south of Damietta, but the number of cases is rapidly diminishing. A sharp outbreak occurred on the west bank of the Nile south of Damietta, but it is now practically ended.

Cairo and Zagazig have both had isolated cases. The history of the Cairo cases is interesting. A "fiki," a reader of the Koran, inhabiting a very poor quarter of Cairo, who had been suffering from a chronic bowel complaint for some time, visited Zagazig, where some cases of cholera existed at the time. Taken ill at Zagazig, he returned to Cairo on November 30, and died on December 1. Certified by an Egyptian doctor as chronic dysentery, he was buried. By chance the Sanitary Department heard that a man arriving from Zagazig had died under somewhat suspicious circumstances. The house and inmates were placed under medical supervision. The family consisted of the man, wife, two grown-up daughters, and a son aged 7 years.

On the night of December 6 one of the daughters was attacked with cholera, a typical case both clinically and bacteriologically. She died the next morning.

On the night of December 9 the son was attacked, and died in the cholera hospital on December 11. All the inmates of the house were isolated and placed under medical observation, the house thoroughly disinfected, and no more cases have occurred.

The case of the father was heard of by chance; how many such cases are occurring in the country about which nothing is known. Here lies the danger, the smouldering of the disease through the winter, and a gradual lighting up of an epidemic in the spring.

The Sanitary Department is to have its English inspecting staff raised to two—a number quite inadequate for the work to be done in the country. A hygienic institute is also to be created, directed by a European bacteriologist. Graham Bey, of the Medical Corps of the Egyptian army, has been appointed to the new inspectorship, and Dr. Bilter, the Sanitary Inspector of Alexandria, has accepted the direction of the Hygienic Institute.—*Brit. Med. Jour.*

MILK AS A VEHICLE OF DISEASE.

THE first of a course of lectures on Public Health organized by the National Health Society was given by Dr. Thorne Thorne, C.B., Principal Medical Officer to the Local Government Board, on January 14, at the house of the society. Dr. Thorne Thorne took for his subject Milk as a Vehicle of Disease, and gave a short historical summary of the steps by which it had been established that typhoid fever might be distributed by milk. He stated that, as far as the experience of this country went, it appeared that milk became infected only if it were actually contaminated, either through infected water or directly with the specific infection derived from an antecedent attack in man. Passing then to the subject of scarlet fever, Dr. Thorne Thorne stated that Mr. W. H. Power, after prolonged investigation, had been forced to the conclusion that antecedent infection by human agency was in the case of this disease not necessary, but that its infective character might be derived from a communicable disease of cows which stood in some definite relation to scarlet fever. Milk might become the carrier of the infection of diphtheria also, either as the result of infection reaching the milk from an antecedent case in man or as the result of a definite disease in the cow. Dr. Thorne Thorne added that the storage of infected milk, by giving time for the multiplication of the organisms of diphtheria, increased its poisonous property, whether the cream or the skim milk were used. An outbreak of cholera was described in which the infection was conveyed to the milk by the addition to it of water which had become specifically contaminated. After mentioning foot-and-mouth disease as another infection conveyed to man through milk, the lecturer passed on to the consideration of tuberculosis. He said that the power of tuberculous milch cows to transmit the disease through their uncooked milk had been demonstrated to conviction, and the only question which remained was to determine the extent and character of the cow disease which made the milk dangerous for human consumption. It was certain that whenever the udder was involved there was very great danger, but it was unfortunate that it was by no means easy always to detect the beginnings of udder disease. Reference was made to the use of tuberculin as an aid to diagnosis, and Dr. Thorne Thorne inculcated the necessity of using only milk which had been boiled or otherwise cooked if all danger was to be avoided. Having regard to the heavy mortality from tuberculosis amongst infants and children, he urged the elimination in this way of the serious risk of the communication of the disease by infected milk. Subsequent lectures in the course will be delivered on following Tuesdays by Professor W. H. Corfield, on Drains and Sewer Air; by Dr. Louis Parkes, on Ventilation; by Mr. Ernest Hart, on Milk and Water; by Mrs. Scharlieb, M.B., on Physical Training; by Dr. J. E. Squire, on the Prevention of Consumption; by Dr. Schofield, on the Hygiene of the Nursery; by Mrs. Clare Goslett, on Women in Sanitary Work; by Dr. G. V. Poore, on Village Sanitation; by Dr. Shelly, on the Hygiene of Schools; and by Mr. John Gay, on Sanitary and Insanitary Homes. The lectures are given at 5 P.M., and further particulars can be obtained from the secretary, 53 Berners Street, W.—*Brit. Med. Jour.*

PRACTICAL DISINFECTION OF ROOMS.

THE frequency with which second and third cases of scarlet fever appear in houses that have been disinfected by the inspectors of sanitary authorities casts grave doubts on the efficiency of the procedure usually adopted, despite its official sanction. Stripping the walls, lime-washing walls and ceilings, and scrubbing wood-work and floorboards with soap and water are indeed effectual enough, and to these when thoroughly done we are disposed to ascribe any successful results rather than to the more technical process of so-called disinfection by sulphur fumes, which is little better than a superstitious rite or incantation shorn of the religious character it had in the mind of Ulysses when he "fumigated" the halls desecrated by the massacre of his wife's suitors after removing the corpses and washing away the blood with a promptness that precluded all thought of other than moral pollution. But in the light of bacteriological experiments dry sulphurous acid fumes, whether generated by burning sulphur or carbonic sulphide, or, as has of late become the fashion, by opening cylinders of the compressed gas, are for all practical purposes useless. The gas would act as a fairly powerful germicide on articles or fabrics previously saturated with water, but its bleaching action precludes its employment in this way with colored materials, carpets, or curtains, and it is as what is called an "aerial disinfectant" that it holds its ground in popular esteem. But aerial disinfection is an absurdity; no one wants to purify the foul air, which is easily enough removed by simple ventilation. In disinfecting a room the true aim is to kill the germs contained in the dust on ledges or in the crevices between the boards, or adhering to the walls and other surfaces, and the dry gas is powerless for this, which is best attained by a sublimate solution of the strength of 1 part in 1000, or by lime (not white) washing, providing the lime be fresh burnt and caustic; the carbonate or chalk used in whitewashing under the name of whiting, and into which lime is converted by long exposure to the air, being inert. The series of experiments on the infection and disinfection by various means of wall papers, distempers, and other wall surfaces conducted by Dr. Cronberg, under the direction of the late Professor Uffelmann at Rostock, showed that subsequent scrapings were invariably and almost instantaneously sterilized by washing or spraying with the sublimate solution, and equally so by lime-wash after the lapse of twelve to twenty-four hours. The danger of corrosive sublimate is, we believe, exaggerated, for the smallest fatal dose for an adult being probably three to five grains—equal to at least a quarter of a pint of the solution—*accidental* poisoning with the solution is practically not probable, and as a further safeguard it might be colored with indigo or "laundry blue." Carbolic acid, which is sold without restraint and is in universal use, is more dangerous on that account, and is, indeed, frequently employed with suicidal intent and with fatal effects. In France, Germany, and Italy sublimate has nearly superseded all other disinfectants, and its neglect in this country is inexplicable. As to carpets, curtains, bedding, and clothing, all that is capable of being washed should be plunged in a copper of boiling water for a quarter of an hour and such articles as would be spoiled by this treatment should be disinfected by steam.—*London Lancet.*

PROPAGATION OF TUBERCULOSIS BY THE FÆCES OF CATTLE.*

THE authors have already published experiments showing that tubercle bacilli, when ingested by the dog, traverse his digestive tube and are found intact in the fæces.

Cattle, however, offer a fertile soil for the germ, and their digestive tract is admirably adapted to retain and absorb it. The paunch, with a capacity of nearly 250 litres, permits a prolonged accumulation of ingesta, while its many folds and deep honey-comb cells furnish convenient resting-places for microbes.

Many experimenters have proved that tubercle bacilli passing into the intestine are absorbed by the villi, but no efforts have been made to ascertain whether all or only part of these germs are thus removed from the gut. If not all, then it would seem possible for a phthisical animal, swallowing his pulmonary discharges, or eliminating tubercle bacilli from the surface of ulcerating Peyer's patches, to contribute to the dissemination of the disease through his fæces. With this thought in view, the following experiments were made:

On the 3d, 4th, 5th, and 6th of June, at midday, a meal was fed to a yearling bull, consisting of bread and one-fourth of a cow's lung rich in tubercle bacilli. From the 6th to the 10th, inclusive, they collected, morning and evening, 200 gm. of fæces, which they diluted with 100 c.c. of water.

The filtrate from this product, after standing 12 hours, was injected into the auricular veins of rabbits to the amount of 2 c.c. for each. Fifteen rabbits were thus injected. Two died of septicæmia, 1 of intoxication, and the 13 others became tuberculous. Two died at the end of a month, presenting at the autopsy a miliary tuberculosis of the lungs. The 11 surviving ones were killed between the 9th and 15th of July, and showed tuberculous indurations scattered through the lungs, liver, spleen, and kidneys. In addition to these inoculations, a microscopical examination of the fæces of the bull was made daily, resulting in every instance in the discovery of the Koch bacillus.

---

* Cadiac and Bournay, *Lyon méd.*, 1895, lxxx., p. 461.

These experiments seem to demonstrate that the fæces of cattle are as capable of propagating tuberculosis as are the sputa of man.—*Am. Med.-Surg. Bul.*

THE DISCOVERIES OF KITASATO.

Dr. Behring, it was announced in Germany on the 26th inst., has produced an antitoxine serum for Asiatic cholera. But it appears that he must yield the credit for this discovery to his former associate, Dr. Kitasato, now laboring in Japan, who declared a month ago that he had perfected an antitoxine serum for this disease. Both of these eminent bacteriologists were pupils of Prof. Koch, in Berlin, where Dr. Kitasato studied for seven years, and where he was associated with Behring in conducting the experiments which finally gave to the world the new remedy for diphtheria.

The cholera antitoxine is not the only curative serum which Dr. Kitasato has produced in the extensive laboratory which is maintained by the Japanese Government for his use at Tokio. We referred last year to Kitasato's inquiry in Hongkong, to which city he was sent as a representative of the Japanese Imperial Board of Health, concerning the origin and nature of the disease called "plague" or "black death," an epidemic of which was then in progress. He discovered the germ or bacillus of this ancient and dreadful malady, and he has since produced a curative serum for the treatment of it. Experiments have proved, he asserts, that the serum is effective when injected within six hours after the beginning of the attack. But this is not all. He announces that he has detected the characteristic bacillus of leprosy, and has produced the disease by inoculation with this germ, and by the immunizing process has obtained an antitoxine serum by which leprosy can be cured.

Another discovery must be added to his list. The Japanese soldiers returning from China and Formosa suffered not only from cholera, but also from an abdominal typhus fever of malignant kind. He has found the bacillus of this disease, and is engaged in producing a serum for the treatment of it.

In his laboratories he has a large number of horses, sheep, and other animals undergoing that process of immunization with the details of which all those who are interested in the production of diphtheria antitoxine are now familiar, the process which has been used for months in the laboratory of the New York Board of Health. There he obtains the antitoxines of diphtheria and lockjaw — both of which are now in use in Europe and America—as well as the new antitoxines of cholera, leprosy, and malignant abdominal typhus.

The recent great epidemic of cholera in Japan furnished an abundance of material for bacteriological experiment. The number of cases is reported officially to have been 56,367, and the mortality (39,721 deaths) was exceptionally severe, or about 70½ per cent. In a group of 193 cases treated with this curative serum the mortality was reduced to 33 per cent. While these figures are encouraging, they do not seem conclusive, but it is stated that nearly all of the sixty-four persons who did not recover were brought to the hospital in the last stages of the disease, many of them dying an hour or two later. In such cases no remedy could be effective, but Dr. Kitasato says, it is reported, that the serum is a positive specific when injected promptly after the beginning of the attack. Such an assertion has great weight when it is made by a man so eminent in his scientific province. We may be confident that the serum has been produced by a careful and scientific use of the process followed in the manufacture of diphtheria antitoxine, and that it has been applied properly by a competent person. The experiments of Ferran, in Spain, were not made under such conditions—indeed, the virtue of serum from immunized animals was then unknown—nor is it clear that the more recent work of Haffkine in India has this scientific basis. At another time we may have something to say about Kitasato's treatment of tuberculosis, as to which the only reports thus far published are somewhat ambiguous and probably misleading.

If it shall be shown conclusively by the test of continued use that this Japanese bacteriologist has really produced curative antitoxines for both Asiatic cholera and the "black death" or "plague," there will be a curious fitness in the discovery in the far East of these remedies for two old and dreaded diseases which were born in the East and have their homes in Eastern lands from which the infection has been carried to Europe and the New World so many times and with consequences so deplorable. —*N. Y. Times.*

THE CHOLERA.

AN INFECTED VESSEL AT HOLYHEAD.

THE arrival of the cholera-infected S.S. *Garlands* at Holyhead on January 15 is an illustration of the fact that all danger from seaborne cholera is not yet at an end, even from countries as far distant as Turkey. The vessel in question hailed from the Black Sea, and reported three cases of Asiatic cholera during the voyage, the men having sickened respectively on December 30, 1895, January 2, and January 9, 1896, the former and latter attacks having proved fatal on December 31 and January 11 respectively. Apart from these three cases of cholera, some dozen attacks of illness of a less specific but still severe character occurred in the course of the voyage, though none of them proved fatal, and when the vessel reached Holyhead, four days after the second death took place, all on board were well, and no further cases have developed. Steps were taken by the local health authorities to secure disinfection of the ship and of infected articles, and supplementary measures of precaution were adopted on the arrival and advice of Dr. Theodore Thomson, one of the Inspectors of the Medical Department at Whitehall, who reached Holyhead on Saturday. The vessel subsequently sailed for Barrow-in-Furness, where all was in readiness in case of anything untoward calling for action.

MOROCCO.

Information from Morocco *viâ* the Canary Islands gives an alarming account of the outbreak of cholera, affecting the coast from Casablanca to the southward. Seventy deaths at Casablanca alone were reported. Tangiers is officially declared to be clear. Details of the mortality at other places are not given.

EGYPT.

Nine cases of cholera have occurred at Alexandria since January 5, of which seven proved fatal.

QUARANTINE AT KAMARAN.

Abdul Jubbah, who recently made a pilgrimage to Mecca, writes in the *Englishman:* His Majesty Sultan Abdul Hamid Khan, the protector of the Muslim faith, and the guardian of the holy shrines, is known to have the good of his subjects at heart, and is always anxious about the welfare of the Mohammedans who visit his dominions on religious duties. The quarantine at Kamaran has not the approval of the Sultan. The late Maulana Rahmatullah, a learned Indian Mohammendan, waited upon His Majesty and begged him for the abolition of the quarantine. In reply His Majesty told the Maulana to pray that His Majesty could abolish it.—*Brit. Med. Jour.*

Department of Physical Education.

WITH SPECIAL REGARD TO THE SYMMETRICAL DEVELOPMENT OF THE BODY.

Edited by J. CLARK SLAY, M.D.

(NEW YORK.)

MENTALITY DEPENDENT ON HEALTH.

THE want of ambition, lack of animation, and deficient energy in the majority of instances are usually attributed to indigestion, torpid liver, poor circulation or some other form of ill-health; but that mentality, the power of perception, concentration, decision, memory—in short, the ability to think quickly and correctly—should depend as much if not more upon the development and healthy performance of functions of the body than the size of the brain does not seem to have met with the same general recognition.

Both professional and business men are frequently heard lament the size of their mental caliber and wish that their brains were better developed, as if this were all that was required to insure professional or business success. Such men generally complain of poor memories that compel them to make memoranda, of their inability to think quickly to take advantage of opportunities, and of having so much on their minds as to be unable to give due attention to any one thing, and attribute all these mental defects to the lack of brain development, whereas they are more often the result of imperfect nutrition, not from lack of food or drink, but from want of exercise at regular intervals in the sun and air, to aid digestion, secretion, and elimination.

A large, well-proportioned brain of good quality upon the shoulders of a weak, sickly body, where one or more of the functions are imperfectly performed, is likely to accomplish far less than a much smaller brain that is properly nourished. The power of brain action is dependent quite as much upon physical exercise to aid digestion and facilitate the oxidation of the blood as upon the size of the cerebrum. Few if any of these men suffer for the want of food or drink, for these are more often taken in too great abundance, but from lack of exercise they are not properly utilized.

" The repugnance to exercise arising from mental fatigue, or long inaction, is something that must be carefully fought. What is often mistaken for physical fatigue is nothing of the kind, but rather an opposite effect, the numb pain of inactivity. It will frequently be found difficult in a person of confining pursuits to arise from this state and enter upon even simply bodily exercise. But the inclination to sink into lassitude must be stubbornly fought against. The weariness is of the head and only of the body by reflex action. Once aroused from this condition a person who starts his blood at a quicker pace feels greatly stimulated. The body becomes alive again, and all the functions of the body and mind give a sense of enjoyment. The body becomes warm, and with increased warmth comes increased strength, courage, and perception. The machinery of the brain turns out more ideas to the minute under a quick pulse than under a slow one. This relationship of a quickened circulation to the powers of the brain is, perhaps, frequently overlooked. Students can always take advantage of blood influence by introducing exercise when the brain force grows weak. In prolonged mental effort recesses filled with good general exercise that starts the entire blood system will always be a better method of alleviating the tension than the use of any kind of liquid stimulant. When stimulants aid they aid by giving heat and artificial activity to the circulation. Exercise will supply heat in the safest manner and leave no drafts to make good on the bank account of strength. Stimulants are borrowed heat. Exercise is earned heat."

PHYSICAL EDUCATION IN CHILDHOOD AND YOUTH A MEANS OF PREVENTING DISEASE.*

By C. F. Ulrich, A.M., M.D.

The time is rapidly approaching when the prevention of disease will be regarded as of infinitely more importance than its cure.

The unselfish physician is persevering in his unfaltering efforts to prevent disease, or at least to soften its asperity and shorten its duration; notwithstanding this work seems to go directly against his private interest, in removing to a great extent the source of his income.

There is, however, one prolific source of disease, or at least tendency to disease, of which I have heard very little mention made in medical societies, nor have I read anything about it in medical journals. I refer to the neglect of physical training in childhood and youth. In the earlier ages of the world, when war and the chase formed the principal occupations of the human race, there was not so much need of admonition on this subject. The male child in its tenderest years was taken in hand and instructed in running, leaping, hurling the javelin, and bending the bow, to prepare it for the life it was destined to lead when it reached the period of manhood. In our modern exotic civilization the idea of the necessity for such early training seems to have been lost sight of. Intellectual culture, money-making, and general business habits seem to occupy the entire attention of our people at the present time.

A child inheriting a weak constitution from its parents, whose physical development has been neglected by parents who devoted themselves exclusively to intellectual or financial pursuits, is sent to school to be crammed with evanescent knowledge, instead of having its physical organization developed and trained to endure the hardships of life, and its intellectual faculties drawn out to enable it to think for itself, and acquire the necessary education after its school-days are over. This child is required to sit at the school-desk from four to six hours every day, trying to absorb knowledge, perhaps to be forgotten in a few months after leaving school. There is not even any supervision exercised over the position of the child's body, and frequently the naturally weak child comes out of school with stooped shoulders or lateral curvature of the spine.

Let us now look at the child that has been systematically trained in all those physical exercises that develop the muscles without breaking them down; that strengthen and regulate the nerves without unduly exciting them; that cause a regular and healthy circulation of the blood without overheating it or allowing it to stagnate.

When stricken down by disease the child whose organs have been well developed by skilful training will be able to throw off the products of disease, or even to resist the attacks altogether, while the child whose physical education has been entirely neglected, who has been allowed to sit bent up in the school-room, has to succumb to disease.

Our sanitarians should take the subject into consideration and see if something cannot be done to promote a wise system of physical training, in connection with our intellectual education, which would certainly be an excellent safeguard against deterioration, both physical and intellectual, and would surely do more to advance our people to the highest degree of culture than the present system of cramming the brain with knowledge, and allowing the physical powers to dwindle away, a prey to the ravages of disease and death.

---

* Abstract from *Jour. of Am. Med. Assn.*

GYMNASTICS IN AMERICA.*

In societies, and particularly in the Turnverein, every German considers himself to be one of the pillars of his race in America, and some are earnestly striving to preserve to the German his individuality and to further the spread of German customs and culture. There are but few of these, however, and the great majority content themselves with firing off patriotic speeches at the various festivals, after which they set themselves in earnest to being the most American of Americans.

Americans are wont to welcome with gusto all that is strange and singular to them, and are prone to overlook, in their admiration of outward show and glitter, the worthless principles that may underlie the object of their admiration. Hence the difficulty of making clear to them the purity of purpose and design of the German system of gymnastics, in fact one might almost despair, in that country, of finding any trace of the German origin of the art. At the present day they are quarrelling in speeches and on paper whether the Swedish system, or the newly discovered Swedish-American system, or the German Turnen shall be made obligatory in the schools, although one or the other is taught in some of them. Instead of confining themselves to the subject in hand and making actual trial of the several "systems" and so letting themselves be guided by the results obtained, the whole immensely important affair has degenerated into a mere war of words. Now as the Swedish system is defended by a lady of considerable fluency, but with scant knowledge of the German Turnen, and the Swedish-American system is upheld by another lady and consists only of a mixture of German, Swedish, Rothstein, and anything else gymnastic, we can see that the advocates of the German system have a pretty hard time of it.

That one party should prefer the Swedish is not to be wondered at since it is assumed, and not without some reason, that it affords the easiest method of body-building, always with the understanding that by body-building is meant "muscle-making," and not the development of energy. The advocates of the Swedish-American carefully avoid acknowledging the European sources of their system, probably out of the modesty that is characteristic of their nation, but they do not any the less hesitate to appropriate them to their own purposes. The defenders of German Turnen in the high places are unfortunately not professional men, and consequently the battle is carried on in this quarter with less spirit, especially as the fair sex evidently considers the German system too much like work. Though the reasons for this carelessness are very many, the chief cause lies in the fact that the instructors quickly accustom themselves both to think and to act in an ultra-American manner. Wherever I was a spectator I could see that the chief end aimed at was to make a brave show. "Exhibition work" is their watchword, without the least regard to the real, the educational ends. They overlook entirely the essence of our youth—and school—gymnastics, which is the promotion of bodily endurance and agility together with readiness of mind, quick power of determination, and tenacious will power; in short, both the mental as well as the bodily effects of gymnastics are neglected. With a few exceptions the body of instructors in German Turnen in America are none too well prepared for their new profession into which they have been pitchforked in the absence of regularly qualified men, and this does not improve the outlook of the true representation of our system, nor is it to the best interests of the youth of America. It is true that a graduate of a training school generally receives the preference over others, but the education that these schools afford falls far short of what would be necessary to procure universal recognition and adoption of the German system.

The Americans are too much inclined to regard with interest that which is strange to them, and to go into ecstasies over it. Hence the widespread proneness to strive to outdo each other, to place one's self in the brightest light and thus to win the so-hotly-sought-after dollars.

---

* The above criticism on gymnastics as conducted in America appeared in the *Deutsche Turn-Zeitung* of September, 1895, the organ of the Turnerschaft of the German Empire. Translated by C. F. B. Wall for *Physical Education*.

The salary of a teacher is large in proportion to his celebrity, and, as the art of getting up astonishing exhibitions is just as highly valued as are solid method and true, purposeful work, he cannot very well be blamed if he sets himself to overdo all the others in originality, and to outbid them in marvels in order to make money.

. . . . Now there is certainly a supreme school board sitting at Washington that nominally controls all educational institutions, sends representatives to all conferences in which important alterations in educational schemes may be discussed, and seeks, often with noble expedients, to disseminate education and to lend its support to all efforts in that direction ; but to demand from these well-meaning men a thorough knowledge and understanding of the gymnastic art, of the principles of the German system, would be manifestly unfair.

Thus it is not to be wondered at if he who is so elected teacher of gymnastics immediately sets to work to bring to light something hitherto unheard of. Some examples of exhibitions of this sort may here be given to show the grounds I have for this somewhat harsh-seeming criticism.

A gayly decked hall, almost overlighted ; in the background a wide platform of scaffolding supplied with all the fittings of a great theatre stage. We are at a so-called "Fair," a charitable exhibition. After one of the managers has opened the fair with a speech, and some music has been played, some forty or fifty maidens, the pick of the local schools, troop onto the stage with short mincing steps. All from eleven to thirteen years of age, slim in proportion, complexions of milk and blood, lively eyes and strongly marked eyebrows, triumphant in look and mien. Clad in blue blouses trimmed with white, half-length sleeves, red and white sashes, white embroidered hose and tanned shoes complete the uniform.

The ranks having dressed, a piece of music is played to which some free exercises are performed, then all group themselves alternately, in larger and smaller bands, into the most heterogeneous positions till suddenly the music stops. All then join in a *Tableau vivant*, pointing, beckoning, or looking at the group slowly rising in their midst composed of the seven tallest of the maidens with a tremendous starry banner floating over them ; and out breaks a wild burst of howls, whistles, and stamping in applause as the whole is lit up with red fire. Another speech now and this time we have boys armed with iron wands of at least twenty-five mm. diameter (they are iron tubes) and clad in sailor costume, with the skin of their faces, necks, and breasts stained a weather-beaten bronze. The exercises begin with various poses in which the wands are used to imitate firearms, then comes the so-called "pyramid," in which the wands again play an important part. More red fire, and all collapse in apparent confusion only to come together in a star-shaped formation and present arms. At a sign all wands fall to the ground with a loud crash and are removed by invisible hands, so that the boys may take the poses of throwing, boxing, and wrestling. At a given signal the positions change. A trumpet blast sounds, and the little heroes throw themselves wildly about the platform, portraying two raging mobs threatening each other. Suddenly a blinding white light, and suspended by an invisible wire, the angel of peace floats slowly down from the roof, clad in white and bearing wreaths of laurel and palm. Joyful welcome of peace messenger and mutual embracing of late deadly enemies. Many-colored electric light and ascent to Olympus of angel. Curtain.

* * * * *

Now such exhibitions, designed to amuse and surprise the pleasure-loving masses, and to which rope-dancing, trapeze, and trick-bicycling are often added, are indispensable adjuncts to the so-called "fairs" which are got up in every direction, chiefly during the winter, for charitable purposes. The practice required for such work demands the whole time and constant attention of a teacher, generally a lady, and the true art of gymnastics, whose aim is an entirely different one, suffers accordingly.

The successful introduction of the German system into the United States lies almost wholly in the hands of those who are entrusted with the instruction of physical training in schools and clubs. It is much to be desired that those men who have attained to the intelligent appreciation of the value of our system should endeavor to communicate their knowledge in the same frank spirit in which the advocates of the Swedish and Swedish-American systems have done so. The greatest stress, however, must be laid on the all-round development of the body and of its moral attributes which goes hand in hand with physical training when conducted as amongst us, for though the efforts of such societies as the temperance party may appear laughable to us, yet the justifications for them are many, and it is only the choice of the weapons with which the war is carried on that moves us to mirth as being both singular and exaggerated.

In connection with the proposed introduction of gymnastics into the school schedules as a compulsory subject, it should be borne in mind that the desire for and love of physical training and moral invigoration cannot be suddenly instilled or engrafted; on the contrary, that harmony of action which has won for the German nation its prominent place among the nations of Europe, can be secured only through constant purposeful striving in the acknowledged and proven path on the part of the clubs and of the training schools for instructors, through the awakening of the masses to the real import of the all-round harmonious development of mind and body, through constant pointing to the inestimable value of a healthy, indurated, and vigorous physique, and through the circulation of the practical knowledge of those beneficial gymnastic exercises as set forth and amplified by Spiess. Through real, earnest exercise commenced in childhood, the weak will be strengthened, the ailing and timid be filled with energy and confidence, the vacillating be made resolute, the exhausted receive new strength, and body and mind will join their forces to the accomplishment of noble deeds. Whether other systems than the German are capable of effecting this or not, it is not in the province of these lines to say.

In Germany the gymnastic art did not bear its first fruits in the private educational establishments whose inmates belong to the land-owning classes; the love of manly exercise, of personal valor, in a word, of the old-time knightly deeds, has never altogether lost its hold on the masses, and wanted little impulse to arouse anew in them the delight in keen daring and in the conquering of one's own uncertainty and weakness.

Unwavering, purposeful work and straightforward striving in the right path has won for physical education the same rank as mental training, and in inseparable correlation the two work together for the prosperity of the whole nation.

Physical education must not be confined to the schools alone, solid foundations may be laid there both in theory and in practice, but the further claims for the completion of the all-round development of the body must be left to other institutions, of which the Turnverein has shown itself *facile princeps* in the even and simultaneous development of both the mental and physical qualities.

It is a well-known maxim that if we would successfully introduce a new thing the safest way to go about doing so is to graft it onto its antecedents; thus, to suddenly discontinue all that may appear good and useful in the eyes of the native or naturalized American, and which therefore seems to the immigrant to be worthy of his best efforts, might well prove detrimental to the introduction and growth of German methods. But it cannot be denied that at the display of thorough skill and determination joined to some degree of self-sacrifice a good many will be found willing to labor in co-operation in that work whose primary aim is to procure a firm foothold in America for German gymnastics as well as for German manners and customs, to spread abroad the blessings of real physical training, and to teach the whole nation to estimate it at its true value as a means of education. Then would not only renewed energy and a healthier appearance be given to the alcohol-soaked masses, but the ruling classes would acknowledge and countenance those efforts, and means would be found to render the blessings of systematic physical exercise attainable by all.

One should not be deterred from taking one or more classes of school-children who have been exercised and trained in the German manner and setting them to work before the eyes of the American public, in order that they may exhibit the simplicity and beauty of form as well as the smartness and snap that characterize the system. Of course, it may happen at first that both teacher and pupils will be taken for incapable or ill prepared, and the best master be suspected of bungling. But certainly a few at least of the spectators will not be so blind, and with repetition the recognition of the value of the German system cannot fail to follow.

But before all it is the Turnverein, of which the greater majority may be said to constitute the headquarters of the Germans in America, who are called upon to preserve unsullied the lustre of the German gymnastic art, to labor unceasingly to increase the number of its adherents, and to speed the noble work of rendering it a national institution on that side of the ocean as it is in the Fatherland.

ANÆSTHESIA.

It was Oliver Wendell Holmes, late medical practitioner of Boston, Mass., who, on November 21, 1846, baptized Dr. William T. G. Morton's practical application of ether as a destroyer of sensation in the following words:

"Boston, November 21, 1846.

"My Dear Sir: Everybody wants to have a hand in a great discovery. All I will do is to give you a hint or two, as to names, or the name, to be applied to the state produced and the agent.

"The state should, I think, be called 'anæsthesia.' This signifies insensibility, more particularly (as used by Linnæus and Cullen) to objects of touch. (See 'Good-Nosology,' p. 259.) The adjective will be 'anæsthetic.'

"Thus we might say the state of anæsthesia, or the anæsthetic state. The means employed would be properly called the anti-æsthetic agent. Perhaps it might be allowable to say anæsthetic agent, but this admits of question.

"The words antineuric, aneuric, neuroleptic, neurolepsia, neuro etasis, etc., seem too anatomical; whereas the change is a physiological one. I throw them out for consideration.

"I would have a name pretty soon, and consult some accomplished scholar, such as President Everett, or Dr. Bigelow, Senior, before fixing upon the terms, which *will be repeated by the tongues of every civilized race of mankind.*

"You could mention these words which I suggest for their consideration; but there may be others more appropriate and agreeable. Yours respectfully,

"O. W. Holmes.

"Dr. Morton."

The idea of causing a profound sleep for the purpose of avoiding pain when some unusual influence was to be perpetrated upon the nervous system seems to be as old as history itself. The deep sleep put upon Adam for the removal of the feminine rib is familiar to all careful readers.

The Chinese early in the Christian era used a drug successfully for the production of loss of sensation.

An ancient writer in 1597 says, speaking of a drug for causing sleep: 'When it is used, it is applied to the nostrils of the person, who draws in the vapour and so blocks up the fortress of the senses that he is plunged into the most profound sleep. . . . These things are plain to the skilful physician, but unintelligible to the wicked."

All along for three centuries prior to 1846 there may be found historical events recorded of the practice of *anæsthesia.* But like another great discovery of this century, which was originated by an obscure man who did not seem to have the intelligence to put it in practice and thus missed fortune and glory which has been accorded to a later inventor, who showed the world how to annihilate space by transmission of the human voice, it fell to the lot of William Thomas Green Morton, a young man of 26 years of age, to put into practical use on October 16, 1846, *ether* as the annihilator of pain.

James Edward Newcomb, M.D., in *The Independent* of September 12, 1895, says:

"The discovery of the anæsthetic properties of a certain group of chemical substances (ether, chloroform, etc.) is alone enough to render the present age illustrious. Jackson, Long, Wells, Morton, and others are all claimants for the honor of having been the first to operate under ether anæsthesia. Different cities have erected monuments in honor of these respective men. As is the case with nearly all great historical questions, the matter is still in dispute. The champions of each of the above-named have waged and are still waging a conflict more fierce than that of Michael and the Devil contending for the body of Moses, and the end is not yet.

"By common consent Sir James Simpson was the first to utilize chloroform anæsthesia. His great discovery was communicated to the Medico-Chirurgical Society of Edinburgh in a paper read November 10, 1847. The first application of the new remedy was in the conduct of obstetrics practice; and it seems strange to us now that its use to relieve the pangs of maternity was opposed by the ultra-theological of that day, as contravening the scriptural condemnation of our first mother—'in sorrow shalt thou bring forth children.'

"The advantages of modern anæsthesia (a term coined, by the way, by Dr. Oliver Wendell Holmes, and meaning, literally, 'not perceiving,' or 'not feeling') have been greater than may at first appear to the lay mind. In the first place has been its humanitarian aspect. It has rendered operations absolutely painless. What words can tell how great a boon it has been in this respect to suffering humanity? Again, by the removal of the sense of pain it has greatly lessened the percentage mortality of operations. Pain itself acts as a shock to the nerves, and too much of it may so depress the heart action as to lead to faintness and even death. Moreover, anæsthesia has removed much of the necessity for undue haste in operating. Formerly the rule was, hurry, so as to get the unfortunate patient through his misery as soon as possible. Finally, it has greatly lessened and almost entirely removed the physical depression antecedent to operation. In the old days, if an operation was planned requiring perfect muscular relaxation, the patient was purged, sweated, given rectal injections of tobacco infusions, etc., so as to render him limp and inert in order to overcome the natural muscular resistance. All such measures, of course, depressed the heart muscle, and a fatal result therefrom was by no means rare. But we have changed all that. Now the same result can be attained in a few minutes, and that, too, practically without danger, by the use of ether and chloroform; for they produce not only a blessed Nirvana, but muscular relaxation as well."

The medical profession are not easily convinced of the claim that scientific facts are proved. It was not sufficient to Dr. Warren and the staff of the Massachusetts General Hospital that ether was a success after seeing its application on Oct. 16, 1846, by Dr. Morton.

On Nov. 6, 1846, Dr. Morton was again a petitioner to have his ether used in a capital operation; he was refused, and only after the most urgent appeals of his friend, Dr. Bigelow, was Morton allowed to administer the gas to a delicate girl, who had been in the hospital for over a year suffering from a disease of the knee-joint. After taking the ether her leg was amputated without the least suffering of pain. Contrast this result with the suffering that girl would have undergone if she had not been allowed to take the ether. The shock to her already weakened system would no doubt have resulted in death.

The spirit in which Morton's discovery was welcomed in England is well illustrated by the account given by Sir Russell Reynolds, at the University College Hospital dinner in 1888, of the first operation performed in England under anæsthesia:

"The first operation in this country performed under an anæsthetic was witnessed in University College Hospital. Liston had consented to try the anæsthetic. I can see him now as he said to the students: 'Gentlemen, we are going to try a Yankee dodge for making men insensible.' . . . At length Peter Squire said: 'He is quite ready now, sir.' Liston's knife flashed in the air; I took out my watch to count the time, and the leg was on the floor in six-and-twenty seconds. Liston turned to the students and said: 'This Yankee dodge, gentlemen, beats mesmerism hollow.'"

And the *Lancet* remarks: "That was all the welcome given to the first use of anæsthetics in England. There was no public rejoicing, no Thanksgiving Day, no Te Deum in the churches, no commemoration of the discoverers; the great discovery had to make its way against obstinate prejudice and folly in high places, even in some of our profession; and Liston's somewhat grudging utterance should serve as a warning to those of us who make light of new methods only because they are new."—*Boston Medical and Surgical Journal*, Nov. 28, 1895.

It is a disgrace to our country that Dr. Morton's claim for reward for his great discovery of the practical application of ether has not been granted. No one person has been so indefatigable in urging a full and complete recognition of Dr. Morton than the distinguished and Honorable William R. Hayden, M.D., of Bedford Springs, Mass., who has written a pamphlet in defence of Dr. Morton as the originator of the practical application of ether in surgery. In the January issue of *The Bostonian* Dr. Hayden has again given us a graphic history of Dr. Morton and the first practical use of ether. The article is illustrated, and gives fac-simile letters, which are very interesting reading in the controversy referred to.

William James Morton, M.D., of New York, also prepared a pamphlet setting forth the history of ether application, and the practical use by his father in 1846. A careful reading of all the evidence which has been impartially stated must convince the fair-minded reader that Dr. Morton is still unhonored by his country.

W. B.

THE CONTAGION, MORTALITY, AND PREVENTION OF WHOOPING-COUGH.*

PERTUSSIS occurs at all seasons of the year, from mild sporadic cases to severe and fatal epidemics. It is exceedingly contagious, but is pre-eminently a malady of early life. The contagious principle is probably contained in the exhalation and the vomited and expectorated matter, but has not been isolated as yet. It can be carried by an intermediate person to a child living remote from the original case.

The frequency of pertussis is well known. The laity easily recognize the characteristic whoop, and regard it as a trifling affection. This indifference leads to grave complications and dangers.

The death-rate ranges from 3 to 15 per cent. Under one year it is 30 per cent. and has reached as high as 48 per cent. in epidemics, according to the age and constitution of the infant or the presence of rickets, anæmia, scrofulosis, and other previous sickness. It is said to cause one-fourth the mortality of London. In New York City the annual mortality in the last decade has been about 500. In Berlin the mortality from scarlet fever and measles combined was 55 less than pertussis. In England, Johnson states that in 1876 there were 10,201 deaths from pertussis, and 11,045 deaths from scarlet fever.

In the United States the census of 1880 and 1890 gave the second place to pertussis.

In Chicago, the death-rate of the last 10 years gave scarlet fever 2651, pertussis 1628, and small-pox only 1072.

These alarming statistics would suggest careful prophylaxis and as rigid isolation as in the other contagious diseases, and especial attention to exposure in schools or other public places.—*Am. Med.-Surg. Bul.*

---

* William Sweemer (*Atlantic Med. Week.*, 1895, iv., No. 20).

THE MOUND BUILDERS.

EVERY school-boy has heard of the Mound Builders, and perhaps has seen some of their many mounds which are scattered all over the country, says the Philadelphia *Inquirer*.

He imagines them a mysterious race who lived long ago in this land and then disappeared, leaving no record to tell who they were, whence they came, or whither they went. But they did leave a record in the wonderful earthworks they made; not only embankments miles long, enclosing circles and squares of a hundred acres, but there are burial mounds almost without number.

They made, too, many "effigy" mounds in the shape of beasts and birds; the best example of these is the great serpent mound in Ohio, which is about the queerest relic of the kind in the whole world. It represents a huge snake six feet thick and over a thousand feet long, lying on a bluff which faces a small creek. The outlines of the snake are very plainly seen; between the open jaws is an oval embankment one hundred and fifty feet long, and in the centre of the oval are the remains of an ancient fireplace. The careful details of the work show that it was made for an object. But what could that object be?

Perhaps you have heard of the Snake Dance, which is about the strangest thing ever seen, and is part of the religious ceremony which this people still cling to. It is very likely that the snake mound had a part to play in the religion of those who made it.

Probably the people came here, from time to time, from all the country round and worshipped their gods; perhaps, when some of their great men died they were buried here in the sacred grove; a sort of Westminster Abbey for the old chiefs. So much we now know about this singular relic.

Of course you would like to know how old the mound is. If you cut into any virgin soil which has never been disturbed, you will find above the clay or rock-bed a dark layer of soil formed from the decomposing vegetation—humus, they call it. Now geologists suppose about three inches of this to be formed in a century, and over the old serpent mound in some places this humus is two feet thick; so at this rate it would have been just about eight centuries ago that those weary, plodding people carried their baskets of earth to build the shrine; just about the time when Peter the Hermit was leading his children band to the death of the First Crusade and William of Normandy was fighting the great battle of Hastings.

Another of these effigies is the Elephant Mound of Wisconsin, so called because it bears the form of that animal. But is this not strange? What did people who lived in North America know about elephants? To be sure geologists have told us that such animals once roamed over our land, but we used to think that the last one died before the first man came.

There is no doubt in any one's mind that the men who built the Elephant Mound either saw or had descriptions of such an animal; and we are beginning to believe that these huge animals lived here much later than was formerly supposed.

Not many boys ever get a chance to see the opening of an old grave, so I will tell you of one I opened in Pennsylvania. This mound, by the way, is the subject of a very singular story. It is called the "Grasshopper Mound," and the story is that the children of two Indian tribes, who lived here very long ago, got to quarrelling about a grasshopper; their mothers took up the quarrel and then their fathers; before long a fearful battle was going on and the survivors buried all the dead in one mound.

I need hardly tell you that we found bones and plenty of them. There may have been eighty or a hundred buried in this small mound. In the centre there was a stone grave made of rough slabs of stones. This grave held one body; perhaps he had been a great chief in his day, for he seemed to have much care taken of his burial. The bones were similar to those of Indians. We found a few small pieces of pottery and a polished stone celt, but as we did not find the grasshopper we could not tell whether the mound had any connection with the legend; most likely it did not.

This mound in nowise differed from the so-called Mound Builders' graves. Many, very many of these mounds have been explored by scientists, and they are all about the same. They all contain one or more bodies and sometimes stone graves. Some relics are found, but they do not differ in the least from those which you pick up on any old Indian village site—pieces of pottery, arrow points, stone hatchets, and now and then a piece of copper.

Of course, some mounds are much older than others, but not even in the oldest has anything been found to make us suppose that the builders were very different from the Indian.

The great earthen circles and squares were probably made by the same people who are buried in the neighboring mounds. What was their purpose is yet in doubt. Most probably they were used as a means of defence by enclosing villages; or perhaps they surrounded cultivated fields.

In brief, scientists do not now believe that the Mound Builders were a separate race, but conclude that they were the same as the Indians—the ancestors of the present race. They had the same kind of weapons, the same tools, and the same ornaments. They built mounds for religious rites, for burial, and for other unknown purposes; but with changing customs, mound building became less frequent, and about 200 years ago it passed away as a forgotten art.

Whence came this race we perhaps can never know, but we do know that they lived in this land for almost a thousand years—so long that they have forgotten many of the rites of their ancestors; and we know that they, above all, have the right to say, "We are Americans."

THE ORIGIN OF TOBACCO.

The Prophet was taking a stroll in the country when he saw a serpent, stiff with cold, lying on the ground. He compassionately took it up and warmed it in his bosom. When the serpent had recovered it said:

"Divine Prophet, listen. I am now going to bite thee."

"Pray why?" inquired Mahomet.

"Because thy race persecutes mine and tries to stamp it out."

"But does not thy race, too, make perpetual war against mine?" was the Prophet's rejoinder. "How can'st thou, besides, be so ungrateful, and so soon forget that I saved thy life?"

"There is no such thing as gratitude upon this earth," replied the serpent, "and if I were now to spare thee, either thou or another of thy race would kill me. By Allah, I shall bite thee."

"If thou hast sworn by Allah, I will not cause thee to break thy vow," said the Prophet, holding his hand to the serpent's mouth. The serpent bit him, but he sucked the wound with his lips and spat the venom on the ground. And on that very spot there sprang up a plant which combines within itself the venom of the serpent and the compassion of the Prophet. Men call this plant by the name of tobacco.—*Conte Arabe.*

POPPIES TWO THOUSAND YEARS OLD.

The extraordinary resuscitating power of light received a very curious illustration a few years ago in the silver mines at Lauriam. The mines had been abandoned more than two thousand years ago as unworkable, and consisted for the most part of the "slag" produced by the workings of the miners.

An enterprising Briton discovered that the mines contained plenty of silver, which could easily be removed by the superior modern appliances.

He discovered, however, something far more valuable than the silver, viz., some poppies of a species which had disappeared for twenty centuries, the seeds of which had lain dormant beneath the slag for two thousand years.

When the slag was removed to the furnace, the next visit to the mine found the entire space covered with a most gorgeous show of poppies.

After their twenty centuries' rest they had bloomed as vigorously as ever, without the aid of a single drop of water or any restorative other than the rays of the sun.—*Answers.*

THE
DIETETIC AND HYGIENIC GAZETTE
A MONTHLY JOURNAL OF PHYSIOLOGICAL MEDICINE

VOL. XII. NEW YORK, APRIL, 1896. No. 4

THE VALUE OF MEATS AS FOODS.*

BY R. H. CHITTENDEN, PH.D.,
PROFESSOR OF PHYSIOLOGICAL CHEMISTRY IN YALE UNIVERSITY.

(*Continued from March.*)

UNDERSTANDING now that the main function of proteid foods is to supply the nitrogen needed by the body, we may ask what advantages do meats possess as a source of this nitrogen? In answer, we may reply that they represent a concentrated form of proteid food, their nitrogen is readily available, they are easily digestible, they have an agreeable flavor, they add variety to our diet, they contain extractives which have an exhilarating and stimulating effect, they satisfy the pangs of hunger more completely and for a longer period than the vegetable proteids. These, and still other reasons, may be given as descriptive of the advantages belonging to animal foods, such as meats.

In meats, as already stated, the greater portion of the dry material is composed of proteid, whereas in the majority of vegetable foods the proteid material is associated with a large amount of starch and cellulose, the latter being particularly resistant to the action of the digestive juices. As a result, a large proportion of the vegetable proteid matter ingested is lost to the system owing to the inability of the body to utilize it. It is stated that as much as 17 per cent. of the proteid of vegetable foods is thus wasted owing to the resistance of the vegetable tissue to digestive action. With meats, on the other hand, only about 3 per cent. escapes digestion or is converted into insoluble forms incapable of passing into the blood. The digestion of vegetable foods is certainly a more complex process than the digestion of animal foods, as witness the greater extent of the alimentary canal, as well as its complicated structure, in herbivorous animals. It is also stated, on good authority, that those races who from their environment are forced to depend mainly upon vegetable foods for their sustenance gradually develop a greater length of alimentary canal than is common to ordinary man. Thus, the Japanese, although short in stature, have a greater length of intestine than the European races. Vegetable foods undergo comparatively little digestion in the stomach, but are especially acted upon in the intestines, whereas meats are rapidly digested in the stomach; absorption thus commences more rapidly and hence there is a readier response to the nutrient action of animal foods; they enter more quickly into the general circulation, so that their sustaining influence is more quickly felt.

Again, if a person is to derive the necessary proteid matter solely from vegetable food he must ordinarily consume a large bulk, first because as a rule the proteid matter is mixed with such a large amount of starch and cellulose, and secondly because such a large proportion of the contained proteid matter is unavailable owing to its peculiar environment of non-digestible, or difficultly digestible material. Hence, he must consume a large excess of such food in order to obtain what he needs for the support of the body. With meats, on the other hand, it is quite different. Here, the proteid matter is readily and almost completely available and there is no necessity for engorgement of the alimentary tract. To be sure, there are forms of vegetable foods, as certain cereals and leguminous products, in which the content of proteid matter is large, and where, by judicious preparation, the material can be rendered easily digestible and more completely available. But, as a rule, the distinction holds good, and meats furnish us a form of concentrated proteid food admitting of ready utilization by the body.

---

* A lecture delivered at Pratt Institute, Brooklyn, Jan. 9, 1896.

Furthermore, meats and animal foods in general, either from the peculiar forms of proteid matter they contain, or from the presence of other substances, lead to certain changes in the blood which are somewhat noticeable. Thus, the red blood-corpuscles are increased in number on such a diet, the fibrin of the blood is augmented, and there is an increase in the proportion of mineral salts, especially of phosphates. The muscles also appear to gain additional tone and to show greater firmness when meat is a part of the daily diet. Food rich in nitrogenous or proteid constituents undoubtedly promotes oxidation within the body, thus leading to a greater absorption of oxygen from the respiratory organs. There is thus less sluggishness in the system with a partial meat diet. And it is for this reason that an increase of meats or animal foods tends to counteract somewhat any tendency to obesity, since it leads to an increased oxidation of any fat deposited in the tissues. Vegetable foods, of all kinds, owing to the excess of starch they contain, tend to increase the fat of the body, whereas a food rich in proteid, such as meats, tends to increase muscle and bone, as well as to decrease the fat already deposited in the tissue. Herbivorous animals are especially prone to become fat when well fed, and carnivorous animals restricted as much as possible to a vegetable diet also tend to fatten. Hence, the omnivorous animal, man, may well take at least a portion of his proteid food in the form of meat with the assurance that by so doing he can avoid undue absorption of carbohydrate material.

There is a general tendency toward the belief that animal foods, particularly meats, favor more vigorous physical and mental development than vegetable foods; that a man can work to better advantage, physically and mentally, when the requisite proteids of his daily dietary are supplied in part in the form of meat. Whether this is to be attributed to any difference between the animal and vegetable proteids is doubtful; it may, perhaps, be due as much to the smaller proportion of proteid a man would probably consume on a vegetable diet, or to its lack of availability, etc.; or, again, the lack of nitrogenized extractives which are so characteristic of meat may be an important factor. Quite probably it is to the combination of these several factors that we must look for the true explanation. However this may be, the difference unquestionably exists. Thus, Béclard has recorded in his well-known book that "the workmen employed at the forges of Tarn were for a long period fed with vegetable substances. It was then found that all the workmen lost, on an average, fifteen days' work a year on account of exhaustion or illness. In 1883 M. Talabot, deputy of La Haute Vienne, took charge of the forges. Meat was then made an important part of the diet. The health of all the men afterwards improved so greatly that they did not lose more, on an average, than three days' labor a year. Animal food produced a gain on each man of twelve days' work a year.

"It has also been stated that the Italian laborers from Lombardy, with their largely vegetable dietary, performed much less work when engaged in piercing the St. Gothard Tunnel than their Swiss co-laborers with a more richly animalized scale of diet. Soldiers campaigning have likewise been observed to lose health and fall ready victims to scurvy and diarrhœa if they have been compelled to live on farinaceous foods solely. The great Haller submitted himself for many days to an exclusively vegetable diet, with the result that he found himself more muscularly feeble, and suffered from general languor and a great disinclination to intellectual work; and we have been *authoritatively* informed that one of the most eminent of living philosophical writers restricted himself to vegetable food for three months, and then when he had read what he had written during that period he was so dissatisfied with the work that he burnt all the manuscript!* On the other hand, it is undoubtedly true that for those whose labor is mainly mental and whose muscular exercise is inconsiderable any great excess of nitrogenous food, either animal or vegetable, should be carefully avoided.

Another factor connected with the dietetic value of meats that merits careful consideration is the part played by the various extractives, especially the nitrogenized bodies such as creatin, creatinin, xanthin, hypoxanthin, carnin, carnic acid, etc., which are so prominent in the muscular tissue of all animals and which give character to all so-called meat extracts. These latter are found to have a remarkable restorative action when the system has been exposed to great fatigue, and they unquestionably exert a marked influence upon the action of the heart. A meat extract has little or no real nutritive value, as it is practically devoid of proteid matter, but this stimulating or exciting action is quite noticeable. Now, obviously these various bodies which give character to a meat extract are typical of meat itself and must be ingested with the meat, whether the latter is broiled, baked, or roasted. Their physiological action cannot be ignored on the ground that they are present in small amount, because such bodies are able to produce marked results even when taken into the system in minute traces. Witness, for example, the action of such kindred matters as are thrown into the blood from the suprarenal capsules, small glands sometimes known as supernumerary kidneys, which plainly manufacture some kind of extractive material, endowed with marvellous action upon the heart and upon general blood-pressure. Indeed, it may be questioned, since muscular tissue is so permeated by blood, whether this identical substance is not contained in meats of all kinds in small traces, and it so it is another factor to be taken into account in judging of the merits of meats as foods. Schäfer and Oliver, to whom we are mainly indebted for our knowledge of this suprarenal extractive, have found cause to believe that this substance in passing from the gland into the blood and thence distributed through the body is stored away in the skeletal muscles. If this is really true, it is plain that the muscular tissues, *i.e.*, the meat of animals, must contain some of this principle, and since the principle is not destroyed by moderate boiling with water, it follows that it may escape destruction by cooking. It is further not destroyed by the gastric juice, and as it is diffusible there would seem to be no reason why traces of the body may not find their way from the stomach into the blood, thus adding to our own supply of this stimulating material. According to Cybulski, the blood of the suprarenal vein normally contains the active principle of the gland in sufficient amount to produce marked physiological symptoms.

The suprarenal is one of those glands that until recently has been considered as devoid of any very marked physiological action, but as we now know, in the medulla of the gland there is formed something which has a striking physiological effect upon the muscular tissue generally, and especially upon that of the heart and arteries. Its action is to increase the tone of all muscular tissue, and this result is produced mainly, if not entirely, by direct action. This action can be demonstrated in a negative way by simply removing the suprarenal capsules from an animal, when there is produced extreme weakness of the heart and of the muscular system generally, and great want of tone in the vascular system. Hence, it would appear that at least one of the functions of the suprarenal capsules is to produce a material which is added in some way to the blood, and the effect of which is to assist, by its direct action upon the various kinds of muscular tissue, in maintaining that amount of tonic contraction which appears to be essential to the physiological activity of the tissue.

---

*Quoted from Yeo's "Food in Health and Disease," p. 332.

It must also be remembered that there are other so-called ductless glands in the animal body, such as the thyroid, which undoubtedly also manufacture certain products which find their way ultimately into the blood, and very likely traces of these may likewise be present in the muscular tissue and hence become components of the "meat." These statements may be taken as an illustration of a principle which I believe worthy of some consideration, viz.: that in satisfying the needs of the body for proteid foods with meats we derive certain advantages other than those associated simply with the proteid matter itself. Various extractives, active principles, etc., all endowed with more or less physiological properties, are likewise ingested, as a part of the meat, and add their effects, perhaps to aid in keeping up the tone and vitality of the organism. On the other hand, it is no more than proper to add that meat may carry some less desirable substances, as when the animals slaughtered are not in a healthy condition, but fortunately there is no country on the globe where the conditions are more favorable for the raising of sound and healthy meat than America.

Regarding the use of meats as food there are some interesting facts that may be profitably considered. Thus, it is stated that in western Europe among the easier classes one-fourth of their food consists of meat or fish, three-fourths being made up of vegetables and fruits. In Great Britain the proportion of meat used is considerably larger. In both countries, however, there is evidence of a steady increase in the consumption of meats. This increase, as Sir William Roberts says, is not due to any change of habits among the easier classes, but to an increasing use of meat among the working classes. "As wages improve, the diet of the working classes tends to become more and more assimilated to that of the easier classes. Among the latter it may be said that a state of equilibrium in regard to this point has been attained, or at least approached, and that meat constitutes as large a part of their dietary as it is likely to reach. But with the larger part of the population this is far from being the case. Meat is a dear form of food. In regard to proteid matter lean beef contains, roughly speaking, twice as much as wheat flour, but beef is about four times as dear as flour, so that you may estimate that proteids of animal source are about twice as costly as proteids of vegetable source." Yet in spite of this fact it is evident from the above statements that there is an instinctive desire on the part of the people, without any thought or reference to dietetic questions, for a certain amount of meat or animal proteid as a part of their daily diet; and as soon as there is money available for the purchase of such foods, they are quick to increase their consumption of this important food-stuff. The hard-working laborer is the man, above all others, who needs the full complement of proteid food, and he is adding to his own strength and prosperity, as well as of his children, when he is able to provide his family with a reasonable amount of animal proteid. But there is a lamentable amount of ignorance in regard to the nutritive value of proteid foods, especially those of animal origin, and coupled with this is an utter lack of appreciation of the real connection between nutritive value and cost. The cheapest food is that which supplies the most nutriment for the least money. The well-known maxim that "the best is the cheapest" is not true of foods, for the term "best" in this connection is ordinarily applied to that which has the finest appearance, the finest flavor, the most tender structure, etc., and does not necessarily imply that it is the most nutritious, healthful, or economical. Its high price is dependent solely upon its fine appearance or its rare flavor, the question of nutrition being a minor consideration. Thus, there is no more nutriment in a pound of proteid from tenderloin steak than in the same weight of proteid from the neck or shoulder, and yet note the great difference in the cost. To be sure, the tenderloin is naturally more tender, has a little richer flavor, makes a better appearance upon the table than a piece from the shoulder of the same animal, but it will not supply the body's needs one particle better than the coarse-grained meat from some other quarter.

The high-priced tenderloin is simply a dietetic luxury, quite justifiable for the man who can afford it, as any other luxury may be, but not to be recommended on the ground that it is more nutritious. And yet many a hard-working man with the laudable desire to provide himself and family with a good and nutritious dietary, spends his hard-earned money in a reckless and foolish manner through his ignorance of the fact that the food sold at the highest price is not generally the cheapest. He thinks he must emulate his richer neighbor, and that to economize by buying anything inferior in quality or cheaper in price would be a sacrifice of both dignity and principle. This point has been well discussed in a recent Bulletin issued by the United States Department of Agriculture on the nutritive value and cost of foods. "No one," boasts a coal laborer whose case was cited by Mr. Meriwether in illustration of this very point, "can say that I do not give my family the best of flour, the finest of sugar, the very best quality of meat." He paid $156 a year for the nicest cuts of meat, which his wife had to cook before six in the morning or after half-past six at night, because she worked all day in a factory. When excellent butter was selling at 25 cents a pound he paid 29 cents for an extra quality. He spent only $108 a year for clothing for his family of nine, and only $72 a year for rent in a close tenement-house, where they slept in rooms without windows or closets. He indulged in this extravagance in food when much less expensive food materials, such as regularly come upon the tables of men of wealth, would have been just as nutritious, just as wholesome, and in every way just as good, save in its gratification to pride and palate. He was committing an immense economic blunder. Like thousands of others, he did so without understanding at all that it was a blunder.

A great deal of this kind of folly, I fancy, is attributable to lack of knowledge of the art of cookery. The housewife, not knowing how to properly prepare the cheaper grades of meat so as to make them palatable and attractive, concludes that they are not as nutritious as the more tender and juicy cuts that can be bought at a higher price, and which require little judgment or skill to prepare for the table. Here is a field for missionary labor that will well repay the cultivation, and that it is being appreciated is fully demonstrated by the establishment of New England kitchens, schools of cookery, and other kindred institutions in our large cities. I fancy, too, that knowledge of this kind may be advantageously acquired by those whose means render it perhaps less vital, for a waste of food material is a crime against both pocket and morals.

In conclusion, allow me to say that in my judgment meats occupy a somewhat peculiar place in our category of dietetic articles. A close examination of the dietetic customs of civilized peoples shows that two distinct objects are ever kept clearly in view, viz., the satisfying of the grosser needs of the body—the needs of general nutrition—and satisfying the needs of the higher functions of the central nervous system. Now meats plainly share with vegetables, fruits, dairy products, etc., the ability to minister to the former wants of the body, but in addition, as already stated, they have certain stimulating properties which distinguish them from the grosser vegetable foods. In this respect they might perhaps almost be classed with such articles as tea, coffee, etc., in their power of ministering to the wants of the brain and nerves. As Sir William Roberts well says, "The struggle for existence—or rather, for a higher and better existence—among civilized men is almost exclusively a brain struggle; and these brain-foods, as they have been not inappropriately termed, must be regarded as a very important part of the equipment for that struggle. . . . If we compare, as best we may with our limited information, the general characteristics of the high-fed and low-fed classes and races, there is, I think, to be perceived a broad distinction between them. In regard to bodily strength and longevity the difference is inconsiderable; but in regard to mental qualities the distinction is marked. The high-fed classes and races display, on the whole, a richer vitality, more momentum and individuality of character, and a greater brain-power than their low-fed brethren; and they constitute the soil, or breeding-ground, out of which eminent men chiefly arise." A high standard of nutrition is the best adapted for bringing to full perfection the physical and mental qualities of the individual. The more subtle effects may not be visible at once, but when a certain type of nutrition has been acquired, and intensified by long continuance, handed down perhaps from generation to generation, it becomes an inherent part of the individual, and exercises an important influence upon his character. It is well understood that differences in mental capacity may be explained, in part at least, by differences in the type of nutrition of the brain-cells, and nutrition is unquestionably modified and influenced by the quality of the food consumed. Meats furnish to the body something more than the mere proteid matter contained therein, and the same may be true of all kinds of food, both animal and vegetable. I am aware that in making this statement I am wandering somewhat from the strictly physiological standpoint, but it is necessary to understand that there is a sort of intangible influence exerted over the body by the quality of the food consumed. To quote Sir William Roberts once more: "There are some very subtle and exceedingly curious relations between the quality of the food and the nutrition and vital habits of the body. They are profoundly difficult to understand, and yet are absolutely authentic and highly important. One would think that so long as an animal obtained his due quantity of proteids, carbohydrates, and fats, it did not matter much from what source they were obtained. But this is far from being the case. There are differences in effect not only between animal and vegetable articles of food, but also between one kind of animal food and another, and between one kind of vegetable food and another. . . . Experience has taught trainers that the vital habits and qualities of horses and dogs are considerably modified by the nature of their food. The characteristics of each strain are transmitted by heredity, but in order that they may be maintained in perfection, the offspring must be fed with appropriate food. Trainers will tell you that the hunter and the draught-horse require to be fed differently. The hunter is bred and fed for speed and carrying power; the draught-horse for bulk and strength. In the hunter is wanted rapid liberation of energy within a comparatively short space of time; in the draught-horse is wanted a more gradual liberation of energy and for a longer period. To bring out their qualities each strain must be fed appropriately. The hunter is fed on a concentrated and stimulating form of food — chiefly on the heaviest and most expensive oats — which, if I may so express it, is the 'beef' of the vegetable feeders; and, unless he is so fed, he will not perform satisfactorily in the hunting field. The draught-horse is fed on a lower and less stimulating diet—on Indian corn and chopped hay—food which tends to increase bulk and weight. Slow-going sporting dogs—setters and harriers—are fed chiefly on oatmeal and weak broth, but the coursing greyhound is trained on the very best of beef and mutton; and if these distinctions are not observed neither kind comes up to its best performances." So with mankind, the nature and quality of the nutrient—aside from its containing the due proportion of the several requisite elements—exert a specific influence upon the character of mind and body, and meats may be fairly placed in the front rank of foods as giving important aid toward that higher physical and mental development which belongs to the civilization of the nineteenth century.

THE EXAMINATION OF WELLS AND WELL-WATER.

By Dr. Harvey B. Bashore,
West Fairview, Pa.

Almost every day in some of the country districts the question arises as to whether this or that well furnishes a water suitable for drinking.

Typhoid or diphtheria, perhaps, are prevalent and it becomes a matter of the greatest importance to know if a certain well is likely to spread infection.

Far removed, perhaps, from skilled chemists and trained advice, the physician has to depend on his own meagre resources. In times of epidemics what is to be done must be done quickly, and the people of his community naturally expect the physician to render judgment on all sanitary questions.

First of all it is wise to remember that well-water, however much polluted by cesspool or surface washings, is not a direct disease-producer save when it contains pathogenic germs; and these of course can only be told by a bacteriological examination, which is generally impossible to the average practitioner. But as cesspool and filthy surface waters are the best of breeding-grounds for certain bacteria, it is a cardinal point that a well which is subjected to much contamination of this sort is liable to become a disease-producer, consequently for our purposes it is sufficient, especially in times of epidemics, to know whether or not a well is so contaminated.

The geological character of the strata which is pierced by the well aids us much in arriving at a conclusion. The thick, heavy clays which form the banks of a good many of our rivers is almost impermeable and generally precludes much pollution. I know of one well so situated which yields no more chlorine than the neighboring river (the Susquehanna), although privy vaults are situated within one hundred feet of this well.

Horizontal strata of slate, sandstone, or limestone, if the well is deep enough do not offer much danger of percolation, but in districts where such strata are upturned more or less "on end," there is the greatest danger of pollution, from the fact that the well is supplied by water which percolates from the immediate neighborhood of the well; most likely from the nearest cesspool or privy vault.

If the well is situated in a geological basin the water is naturally drawn from a distant source, but contamination even at this far-away point may pollute the well.

In limestone regions there are always many underground cavities and seams — due to disintegration of the stone — which are liable to carry pollution for great distances; and such a district is sometimes very misleading.

In a region of loose gravel it is needless to state that percolation is very easy, and soiled water is carried unchanged for many hundreds of feet.

A general geological survey of the well with reference to the points mentioned will give much information as to the likelihood of pollution, but positive knowledge can only be had by a chemical examination.

I do not refer to the elaborate analysis for albuminoids, ammonia, oxygen, nitrites, nitrates, etc.; this is all well enough if one has the time and facilities, but for most cases a simple chlorine examination will decide whether the water has been or is polluted from the source we dread most; but this analysis must be made with care and judgment; it is not the absolute amount of chlorine which determines pollution but the relative amount — the amount compared with the normal chlorine of the region — a point which my former instructor, Prof. H. E. Smith, of New Haven, has laid much stress upon.

If one has the normal chlorine of a district carefully worked out, this examination of a well-water will tell absolutely if it is or has been polluted by sewage, cesspool, or privy vaults, and this is virtually all we care about—if the chlorine comes from present contamination we do not care to use the water; if it is only past contamination, neither do we want to use it, for we can never tell how soon the former source of evil may renew itself.

PESTILENCE NOT A BLESSING IN DISGUISE.

By W. R. Bartlett, M.D.,
NORTH GUILFORD, CONN.

In a recent issue of *Munsey's Magazine* the editor of "Impressions by the Way," in discussing the "cost of war," refers to pestilence as contrasted with war in a certain sense as being a "blessing in disguise," inasmuch as it removes the "weak and unfit," leaving the "sound" to propagate a stronger type. And statements of a similar import which have appeared from time to time in other publications would seem to call for opposing reasons. Starting from the standpoint that pestilence is due to an abstract universal cause in a given locality, to which the strong and the weak are alike inevitably subjected, the proposition would be a sound one; for then no doubt the physically weak would be the first to succumb. But science teaches a different and more specific cause for pestilential disease. The cause or causes, according to its teaching, are external to the individual, and in a large degree preventable, attacking those only who bring themselves under the influence. Specifically it is believed to be a germ or bacillus by which disease is transmitted to the person. In an epidemic of cholera, probably the most common form of pestilence of the present age, and which sweeps over the greatest area, this germ is commonly transmitted in impure drinking-water. Are the "weak" and "unfit" more subject to such a cause than the "strong"? On the contrary, are not the strong and robust by nature the more active and careless in their habits and more self-confident in their ability to resist disease, and thus more likely to subject themselves to the prevailing cause, while the weak, from greater inaction or enforced carefulness, may exempt themselves? It is not claimed that such discrimination has been carried out or would be now by the ignorant and squalid who have been carried away by the thousands in great epidemics, still the principle remains the same, and the question, if it admits of discussion, should be examined on lines of sound argument, and the subjects are by no means confined to the class above alluded to. Even in war, which affords the contrast of the article alluded to and which it declares removes the "strong" only because the weak are not subjected, more are killed by disease than in battle, the subjects being the vigorous and victims of epidemic disease or pestilence in a localized form, so common in armies and coincident with the unsanitary conditions of camp life. But granting that the view taken is partially true in a strictly "selective" or economic sense, there are other factors to be taken into consideration which more than offset it in weight. The weakened constitutions of those who survive a pestilential visitation or attack, entailing, as it does, life-long discomfort on the person and an inherited disability to their offspring, would go a long way toward negativing the gain derived from the destruction of the weak or unfit. Also the great moral, social, and financial depression which always follows in the wake of pestilence, widespread or localized, is an untoward influence that only time and the recuperative energies of a people can overcome. Whatever may have been the result in the Middle Ages, when civilization was at a low ebb and ignorance of sanitary laws abounded, practically the question presents itself as a problem of to-day. To say that the extermination of the weak may be desirable is somewhat akin to the sentiment that it would be better to destroy the heathen than to Christianize them by elevating influences, better perchance to disseminate disease germs among them and blot them from existence rather than teach them the laws of sanitation and surround them with hygienic influences. The view enunciated in the article quoted is one phase of the theory advanced by Malthus, that the three great checks for over-population and consequent direful influences are "war, pestilence, and famine," a view which has permeated the teachings of economists in the past more than in these hygienic days, though still too prevalent, and which in the opinion of the writer cannot be substantiated by the history of any people or nation; on the contrary, the closer a people has kept to hygienic influences, by so much has it advanced in all the higher civilization. How much more just and humane are the teachings that pestilence is always a calamity, than a belief even in the slightest degree in his three great panaceas for depressed humanity, which are twin brothers and congeners of barbarism, pauperism, and crime.

PREVENTION OF TUBERCULOSIS BY FEEDING.[*]

By Ephraim Cutter, M.D., Harv. 1856, Univ. Pa. 1857,

NEW YORK.

Introduction.—Tuberculosis is clearly the disease whose chief anatomic lesions are tubercles, *i.e.*, little tubers ("small potatoes" indeed) whose dire results are very great. They are minute, ovoid, obovoid, or globular bodies, the products of biologic tissue invaded and preyed upon by a parasitic fungus whose infant state is generally deemed to be a bacillus and the mature form to be the mycoderma aceti, which generates acetic acid or vinegar. In other words, the action of the acetic acid of the vinegar plant itself and of the vitality of the invaded tissues result in hard little tubers (tubercles) as is well known. Like, but *large* tubers are seen in plant biology; for example, the tumors on pear-trees invaded by a fungous parasite, whose bacteria, mycelia and fruit (sporanges) penetrate the profoundest depths of the dense woody tissue, cambium and bark, as some twenty years ago I demonstrated by direct solar projections to members of the Massachusetts Horticultural Society at Boston.

In general terms, *tuberculosis* includes: 1, consumption of the lungs, oftenest recognized and is meant when the word "consumption" is used; 2, consumption of the bowels is, in my opinion, the most frequent form and most unrecognized. Foster's dictionary disposes of it in two words, *i.e.*, "tuberculosis intestinalis;" 3, tuberculosis of the joints; 4, visceral tuberculosis. While it is not intended to quarrel with nomenclature here, the writer thinks that the following definition of tuberculosis is most expressive, to wit: "Partial paralysis and interstitial death."

By feeding is meant the prehension of outside substances that enter the body and become normal parts and parcels of that body, or confer the force needed to sustain life, thus including air as food. This very old idea needs to be revived, as so many now believe that tuberculosis is propagated by inhalation in air unpurified by sunlight and damp with abnormal moisture, in which foreign bodies more easily float in their aerial flight.

Feeding Causes Tuberculosis.—One thousand cases of evidence are enough. See "Relation of Alimentation and Disease," by J. H. Salisbury, M.D., 1888, J. H. Vail & Co., New York. Ten hundred and twenty-six healthy swine were fed on sour whiskey distillery slop until all were ill; 250 died and 104 autopsies were done in which were found tubercle bacilli. *Per contra*, 600 healthy swine were at the same period of time kept in pens next adjoining the above 1026 swine, and fed on good sweet maize. None contracted tuberculosis, as they ought to have done according to late dicta adduced in support of the isolation of clinical tuberculosis. The evidence shows that 600 healthy swine penned next to 1026 tuberculous swine, fed on proper food and breathing air laden with tubercular bacilli from a regiment of tuberculous hogs, *did not take tuberculosis.* Apply this to man, and you have the proposition that *if you feed healthy people on proper food they will not contract tuberculosis in their vitiated air food.* More of this later, as we wish now to insist that tuberculosis prevails in those who feed on food that ferments in the alimentary canal with the acetic acid fermentation, or are fed on food that contains vinegar in excess before eating. When the mycoderma aceti is confined to the alimentary canal, as it is in very many cases of tuberculosis, consumption of the bowels occurs and constitutes a large majority of the cases of chronic diarrhœa. Innate or other strengths of the intestinal epithelia constitute such a barrier that the vinegar yeast does not get into the blood. But when the villous epithelia are paralyzed by the CO_2 gas or made drunk by the alcohol formed in the alimentary canal (unless special means are used to prevent, alcoholic always runs into vinegar fermentation) then the said epithelia lose their power of resistance (much as an intoxicated person does) and suffer the mycoderma aceti to traverse them and enter the blood, where it is easily detected by the microscope, any time within a year before lung necrosis ensues sufficient to be positively recognized by the usual signs furnished by auscultation and percussion. And this microscopic inspection becomes a *sign* of the *pre-tubercular* state. (See essay submitted to the American Medical Association, "On a New Physical Sign of the Pre-tubercular State," 1877.)

---

[*] Read by title in the Section on State Medicine, at the Forty-sixth Annual Meeting of the American Medical Association, at Baltimore, Md., May 7-10, 1895.—*The Journal.*

Why the lung apices are the favorite site of tuberculosis is well explained by the facts:

That the lung capillaries are very sensitive to and contract from the application of cold.

That when in "catching cold" these capillaries contract, catch and detain collections of mycoderma aceti which otherwise would harmlessly pass through the capillaries.

That these form emboli which obstruct the circulation.

That the lung apices being near the outside air are most accessible to cold.

That because of their position in a comparatively inelastic part of the thorax, the apices are not very expansible, save by forced respiration, and thus are an easier prey to tuberculosis than the other parts of the lungs.

And that the troubles caused by the plant and animal tissue in this embolism retard circulation and produce tubercles somewhat as in the pear blight aforesaid.

To me the above is evidence ample to prove that improper feeding produces tuberculosis.

In his study of "Evidence," Ram says that "Fact is eternal." A finger put into the fire burns, as a rule. The burned finger is a fact. It makes no difference as to the witness who testifies that "fire burns"—whether an angel from heaven or devil from hell—whether a liar or truthful person—whether a virtuous or unvirtuous man—bond or free—yeoman or nobleman. The fact is eternal that "fire burns." Let doubters try it and see. So I affirm, if the facts as to 1600 swine are disbelieved, the doubters must upset the evidence by repeating these experiments. *This has not been done.*

I testify that I have yet to see a case of human consumption where its cause could not be traced to improper feeding more than anything else. The fact is that society ethics exalt to the highest plane foods which, if not digested, ferment at once with alcohol and vinegar plants. More than 25 per cent. of the deaths of civilized man are from tuberculosis—the same proportion as in the hogs aforesaid.

Proper Feeding Cures Tuberculosis.—Or, rather, feed properly and, other things being equal, Nature cures tuberculosis. To prove this, it is my privilege to refer to the *Transactions of the American Medical Association,* 1880, in which I reported 25 out of 70 cases of consumption, cured by stopping causes (improper food); oiling the machine with medicines and by hygiene — Nature healing, as she usually does, no matter what you call the means of cure, even in cures by humbug! Nature is the healer, if she has a fair chance, regardless of diagnosis or conventional medical nomenclature. As with the gospel so with medicine: "I," Paul, "have planted, Apollos watered, but God gave the increase." "Nature" means something born. God is the father of Nature. Nature, then, is but another term for God's power. Indeed, physicians are but as husbandmen planting and watering, while the cure is Nature's.

This item of cure is introduced to complete the full grasp and circuit of the subject. The synthesis and restoration of tuberculosis makes, we think, a ring completely environing the subject in every part. As these caused and cured cases of tuberculosis, though long made known in print, have not been upset, we will show that tuberculosis can be prevented by:

1. Special feeding, avoiding causal foods. This axiom needs no explanation, but for the once fashionable treatment on the principle of homœopathy that tuberculin is the cure for tuberculosis, meaning the treatment of results by results. But is it not a better principle to avoid the causes beforehand? Certainly this is according to everyday ethics and the Section on State Medicine, the keystone of whose arch is *prevention*. Avoid fire and there is no burning. I avoid the food that produces tuberculosis and I have *no* tuberculosis. Or, to put it differently and concretely, the 600 swine avoided the sour food of the 1026 swine and hence did not have tuberculosis as the 1000 had. On the rules of evidence these facts are not disproved. It must be admitted that healthy swine fed on good sweet maize and avoiding the vinegar slop of the 1026 *did not have tuberculosis*

But you say: "Men are not hogs." That may be, and yet there are lots of humans who are voracious hogs, making swill-tubs and vinegar yeast-pots of their alimentary canals, so that their fæces have raised bread, a sample of which is in my possession, made at my instance, confirming the experiments of Salisbury. Said 1026 swine could not help themselves. Men can. They can prevent tuberculosis by avoiding all foods that ferment with the common alcohol (*saccharomycetes cerevisiæ*) and vinegar (*mycoderma aceti*) plants. Such are all vinegars and vinegar liquids—starches and sugars in excess—all composite foods (made up of many articles) sweetened with sugar, glucose, maltose, levulose, frugulose; in fact any animal, vegetable, or mineral foods that ferment with alcoholic and vinegar fermentation. Foods that ferment into sulphydric acid and phosphydric acid are admissible, but must be used so that they will not ferment, else nerve palsies will occur. The judicious use of hot water prevents these paralyses by maintaining a downward peristalsis.

Celery, lemons, horseradish, butter, pepper, and salt may be used as relishes. Hot water, clear tea, coffee, and cocoa serve as drinks. Avoid corn-meal preparations, beans, soups, sweets, pies, cakes, pickles, sauce, preserves, fruits, vegetables, greens, pancakes, fritters, crullers, griddle cakes, salads, and mush. Vinegar should be carefully avoided. This list is for patients, not healthy people; still it would be well to remember it.

2. General rule for feeding to prevent tuberculosis in healthy people: By bulk, two-thirds animal food to one-third food from the vegetable kingdom. Liquids at will, save sugars in excess. See "Food in Motherhood," E. Cutter, David Stott, 370 Oxford Street, London. Mothers on this diet, before and after pregnancy, have children with good constitutions. Lactation is full, free, and not cut off prematurely. This is written advisedly. Children are a joy, not a sorrow nor nuisance in the house. Motherhood on this proportion of foods presents the most lovely spectacle seen on earth. Nothing more beautiful can arrest the gaze than a properly fed and kept motherhood, the "*ne plus ultra*" of domestic, social, and "State medicine" bliss! Human beings thus raised will have the least tuberculosis. In fact, such constitutions will resist the invasion of tuberculosis by their very strength and integrity. Little fear would there be of tuberculosis by contagion or by infection, or the introduction of tuber-

culous matter under the skin of perfectly healthy animals. If so, then healthy kine tested with tuberculin infection would all have tuberculosis. Dr. R. L. Watkins was thus tested harmlessly a few years ago. Some unprotected persons have passed through life without having small-pox or measles, or scarlatina or diphtheria, though very much exposed. Even malaria needs a subject ill from malfeeding or some other depressing cause. The immunity of healthy nursing infants is a matter of observation. A perfect roof does not leak. Leaks come where roofs have solutions of continuity, *i.e.*, holes. A well-made carriage goes over unhurt almost any kind of road, when one with loose bolts or tires or spokes, or cracked journals—to name no more—breaks down. Thus much for communication by *infection.* Now for *contagion* by the air.

Careful students of the morphology of the air realize what a vehicle the atmosphere is for all sorts of substances. Take the dust that gathers on top of railroad station advertisements for example. Most observers will readily agree that tuberculous bacilli or pavement epithelia invaded with bacilli or with the zoöglea form or the mycelial form of the animalized mycoderma aceti, invade the air passages of almost every one, perhaps daily and hourly. The universal presence of alcohol in the atmosphere from decaying organic substances results from nature's means to rid the world of unused and useless fruits and vegetables, else we should live in a vast charnel-house defiled by dead and dying organic substances. So that as vinegar is made from alcohol by artful use of air, it must be there are more or less vinegar plants in the atmosphere, and hence we must be more or less surrounded by aerial tuberculous bacilli. But sunlight and healthy secretions destroy these bacilli, or form a sterile nidus or soil for them wherein they do not develop. Hence the healthy body offers no habitat for this or other noxious vegetations. So we return to where we started from, to wit, that proper feeding immunes from tuberculosis.

Domestic contagiousness of tuberculosis is explained by the fact that families generally live on the same foods now known to be causal, and the reason why all do not die is that some members resist more than the decedents. Lawn hose pipes do not go to pieces all at once like Dr. Holmes's famous "one-horse shay," simply because their structure is not homogeneous, but weaker in some points than others. For one, I do not think that the average healthy person contracts tuberculosis by inhaling dried or other consumptive sputum. For something like twenty years, I have studied such sputa, *con amore*, with an Amici pattern microscope where my breath constantly passes over tuberculous expectoration. I have no consumption of the lungs. And this, too, when during childhood and youth I was disabled by consumption of the bowels! Had I lived on the foods here laid down to be avoided, doubtless I would have contracted lung tuberculosis, and dying might have served as a fine example of the contagiousness of tuberculosis by inhalation! To me the State legislation proposed for the seclusion of consumptives is unwise, because I believe that simple, plain rations of wholesome food can stop the dissemination of this disease. As to contagiousness by the alimentary canal, it may be said that all tuberculous food cooked to a temperature of 212° F. will destroy its power of coagulating the albumin of the germs, so that they will not propagate on a favorable soil any more than bread baked at 285° F and showing automobile bacteria afterward will raise dough. (See essay on "Leavens and Man" in archives of the Philosophical Society of Great Britain, deposited 1882.) Were it not for baking, common bread, eaten as dough, would soon produce tuberculosis of all eaters. It is a wonder that pumpernickel bread does not kill more Germans.

Finally, since air food is eaten about twenty times a minute during man's existence, since air is so vital an article that we are named "animals," and since our beloved and honored Dr Lewis A. Sayre found that forced respiration cured cases of lung tuberculosis (and some tell the same story for vocal culture), *go in for air food* freshened by sunlight and purified by the winds of heaven.

Let patients take in full breaths of such air. Have the whole lungs, apices and all, fully expanded. Keep the lung capillaries well dilated by easy voice culture or by the passive effect of music, as shown by Professor Doziel, of Kazan, Russia. Feed the right solids, semi-solids, and liquids. Maintain good hygiene and thus do much to prevent tuberculosis in a common-sense rational way.

120 BROADWAY.

INDIVIDUAL COMMUNION-CUPS.

By Ellen A. Wallace, M.D.,
STATE SUPERINTENDENT OF HYGIENE OF THE WOMAN'S CHRISTIAN TEMPERANCE UNION.

One year ago an apology was required for proposing any change in the manner of administering the sacrament at the Lord's table; now the question of individual communion-cups is so freely discussed by clergy and laity in religious, scientific, and secular journals, that no such apology is needed, although we must always approach this subject with a spirit of reverence, not only toward Him who said, "Drink ye all of it," but toward all the generations of these nineteen centuries who have observed this sacramental rite.

As the advance of science shows the ways in which diseases are communicated, we should do all in our power to avoid such communication by our customs, be they in the family, travelling car, school, or church. Certainly the church, aiming to do all she can for humanity, should be ready to remove danger from her own flock as soon as such danger is discovered. And when we know how many churches all over the country, and of nearly all denominations, have changed their custom during the short time this question has been agitated, we believe that all will be ready to act as soon as they can be made to realize the importance of the movement.

Those who are working for the better sanitary condition of our country and of our State, who are aiming to decrease our death-rate by the avoidance of contagion, should agitate this question thoroughly and everywhere advocate the removal of the common drinking-cup, educating the people to realize its dangers and their duty respecting it toward their fellowmen. During the past year many county and state medical societies have adopted resolutions recommending to churches the use of the individual chalice for the communion service.

There is no question that many diseases can be transmitted by the secretions of the mouth; in the present manner of communion these secretions enter the cup and also adhere to its edge, to be removed by later communicants. At a recent meeting of the Monroe County Medical Society, in New York, an epidemic of diphtheria was reported by one of the health officers. This epidemic was confined to a single school district, twenty-four families being afflicted. The contagion was traced back to the drinking-cup used in school, and used by the diphtheritic children, microscopic examinations revealing the diphtheritic microbes adhering in great quantities to its rim. Another epidemic has been reported from California, in which it was believed the communion-cup was the cause of the spreading of the disease.

Dr. Albert Ashmead writes for publication the following, which illustrates frequently existing conditions: "The last time I knelt at the communion altar there knelt at one side of me a patient whom I knew (as I was treating him at the time) to be suffering from an odious disease; his mouth contained patches which made it especially contagious. This person took the cup before it came to me; of course I let the cup pass. At another time the person next to me, but following me in the use of the cup, was also a patient of mine in an advanced stage of tuberculosis; the mouth of this patient was in a condition dangerous to his neighbor."

Many pathologists have made microscopic examinations of the wine remaining in a common communion-cup after service and have found abundant proof of its power of contagion. We will refer to but one of these. Dr. H. S. Anders, of Philadelphia, writes: "In May last I found in two out of five specimens examined from a communion-cup the following: several bacilli of tuberculosis, staphylococci of pus formation, numerous pus cells and epithelium from the mouth, showing the dangers inherent from promiscuous contact."

Certainly the custom of returning to the bottle what is left in the cup after service should be abolished. Investigation reveals this to be the custom of many churches, and some even send that bottle, with its rinsing of lips and mustaches and its accumulation of microbes, to the sick of the parish, who in their weakness are especially susceptible to contagion.

Many have said, "I cannot remember the time, when partaking of the sacrament, that I did not watch the cup which would come to me, my spirit of devotion being affected by the amount of satisfaction or repulsion which followed such observation."

Certainly we should consider it unclean for all to drink coffee from the same cup at a church social. Why, then, is it strange that many have the same feeling at the Lord's table? It has been rightfully advocated that, if the common cup is thus offensive to many, if it usurps the place of Christ in the sacred memorial, a remedy should be sought for and applied. We are told that when Leonardo da Vinci, the celebrated historic painter of Italy, was engaged upon his great painting upon the wall of the convent of Santa Maria delle Grazie, "The Last Supper," representing the Saviour and his disciples at the paschal feast, each supplied with an individual portion of bread and an individual vessel of sacred wine, a person was invited to examine the work, who soon began to enlarge upon the beauty of the chalice, the painter immediately dashed his brush across the object of admiration, because, he said, he had made a mistake in not so painting the picture as to make the face of the blessed Master the centre of attraction.

It is argued that when the common cup is discarded we abolish the spirit of unity which Christ sought to exemplify. Not so. Churches adopting the individual cups testify that partaking in unison and bowing in prayer at the same time increase the spirit of fellowship.

By their use the service is shortened, the attendance is increased, for each member is made to realize that a cup is filled for him and put upon the Lord's table, and if it is not taken it shows by its presence the absence of the owner.

There have been various changes in the method of administering the sacraments—in some ages the bread and wine were mingled together; in some the priest partook of both emblems and the people only of the bread; at one time the wine was imbibed through a tube called a fistula; at another the eucharist spoon was used, and at still another each communicant took to the altar a small vessel in which a portion of the mingled bread and wine was placed, then carried to the lips. Thus from history we learn that the spirit of the observance is the one great matter of importance, but the method is subject to change, according to the civilization and the customs of the times. Even where the common cup is used the number is increased to two, ten, or twenty, for convenience; considering this and the example of previous generations, need we hesitate to advocate a change for cleanliness and health which shall be of benefit to our fellowmen, if it does not destroy the sacredness of the memorial?

Department of Physiological Chemistry.

WITH SPECIAL REFERENCE TO DIETETICS AND NUTRITION IN GENERAL.

Edited by R. H. CHITTENDEN, PH.D.,

Professor of Physiological Chemistry in Yale University.

INTERNAL SECRETION.

AMONG the many glands of the body, the so-called ductless glands have always had an especial attraction for the physiologist since their apparent lack of definite function has constituted a striking exception to the general law in regard to structures rich in cellular elements. That this conception of the ductless glands is an erroneous one we are now obtaining good evidence, and we are moreover being brought to the point of believing that a gland devoid of a duct for carrying off a definite secretion may still possess marked metabolic activity and give rise to products of as great value to the economy as any contained in a fluid secretion. Obviously, such products as are formed in this class of glands must pass inwards rather than outwards; *i.e.*, into the blood, either directly, or indirectly through the lymph, thus gaining an opportunity to exert such physiological action as they possess at various points in the body. Passing into the blood-current, their wide distribution is insured, and sooner or later they must reach that portion of the vital machinery where their presence is most needed. This is the modern conception of internal secretion, in which such glands as the suprarenals, thyroid, thymus, etc., are especially concerned; glands which manufacture one or more chemical substances, each and all possessed of strong physiological power. Nay, more than this, the bodies so manufactured are apparently of prime importance for the very life of the organism—at least in some cases—if we can judge from the results which follow the removal of these glands from the body. A few physiological experiments with extracts from such glands as the suprarenal, for example, will impress even the most sceptical with the wonderful power possessed by some of these substances. Again, the diversity of action is to be noted, for while the extracts from some glands have a marked action upon the cardiac muscles, etc., thus exerting an influence upon blood-pressure, others have a more marked influence upon nutrition, either upon some special phase of nutrition or upon nutrition in general.

Internal secretion, however, may not be limited to the ductless glands, but may even be a function of glands, such as the pancreatic, which have other and more important work to perform. Indeed, all of the secretory glands primarily concerned in the manufacture of the various digestive juices may have secondary functions allied to those of the ductless glands. That such diversity of function may exist in a single gland there can be no doubt. Thus, in the pancreas we have clear evidence of some connection on the part of this gland with the ability of the body to burn ordinary blood-sugar, since extirpation of the pancreas in some animals causes profound diabetes, and this in addition to the more apparent function of manufacturing the pancreatic juice. There is certainly no reason for doubting the assumption that all glands produce certain substances primarily intended for absorption and for some special purpose of physiological moment. Indeed, we may even go so far as to assert that many of the so-called waste products of muscle metabolism—bodies which come from the breaking down of the proteid matter of the tissue in connection with the life of the muscle—such as creatin, creatinin, xanthin, hypoxanthin, carnin, etc., all exercise a certain influence, either directly or indirectly, upon the nutritional processes of the body. Assuming this view to be correct, we see a close parallelism between the internal secretion of the ductless glands and the corresponding metabolism of muscular tissue, in that the products of the latter, like those of the ductless glands, may perhaps exert more or less beneficial influence upon the general processes of nutrition.

What now is the chemical nature of these active substances secreted by the ductless glands? If we attempt to answer this question in a general way, the answer must be exceedingly indefinite, but if we take the case of the thyroid gland we can be somewhat more precise. In the first place, the physiologically active substance does not appear to be a proteid or nucleoalbumin, but rather some body or bodies more closely comparable to the ordinary extractives. Thus, Fränkel has isolated a crystalline body readily soluble in water and alcohol, but insoluble in ether, to which the name of thyreoantitoxin has been applied; a body which gives some of the physiological results obtained by feeding the thyroid gland. Baumann, as noted in the last number of the GAZETTE, has separated a peculiar iodine-containing body—thyroiodin—which also shows some of the physiological properties of the thyroid gland. Lastly, Drechsel in a preliminary announcement just published * has reported the finding of a third crystalline body, different from the preceding, but like them showing some physiological activity. It would thus appear that in the thyroid gland at least three distinct and physiologically active substances are developed as a result of the metabolic activity of the gland, all three presumably being thrown into the blood-current and thus rendered available for the needs of the body. All three of these bodies are apparently quite simple in their structure, at least as compared with proteids, and may eventually prove to have as definite a chemical constitution as creatin or other like extractives. While we must obviously wait further study of these bodies before anything very definite can be said as to their exact chemical and physiological nature, we are certainly warranted in the statement that the metabolic activity of the thyroid gland, and doubtless of other like glands also, is of as great physiological moment as that of any ordinary secreting gland that forms a true secretion. The bodies elaborated in the gland, and which practically constitute the basis of the internal secretion, no doubt result from as profound a metabolism as that taking place in any gland or tissue, and their physiological action, if the preliminary results are to be trusted, certainly equals in importance that of any products formed in the body. In conclusion, we may indulge in the prophecy that sometime in the future, when the subject of internal secretion shall have been unravelled, it will make one of the most interesting and fruitful chapters of modern physiology.

THE DISTRIBUTION OF IRON IN ANIMAL AND VEGETABLE CELLS.

OF late years much attention has been paid to the presence of "masked" iron in animal and vegetable tissues, and especially interesting is the fact that this combined iron appears to be intimately associated with the nucleins and nucleoproteids of the cell. The more intimate study—especially by microchemical methods—of the various parts of chemically active cells is surely destined to throw much light upon many physiological processes, at the present time obscure or but dimly comprehended, and a recent paper by Dr. Macallum,*

---

* *Centralbl. f. Physiol.*, 1896, no. 24, Band 9, p. 705.

* On the Distribution of Assimilated Iron Compounds, other than Hæmoglobin and Hæmatin, in Animal and Vegetable Cells, *Quarterly Journal of Microscopical Science*, vol. 38, p. 175.

Assistant Professor of Physiology in the University of Toronto, affords a good illustration of the value of the results to be gained by this method of work. Some of the data presented, moreover, have a direct bearing upon questions frequently discussed in this journal, and we therefore lay before our readers a few of the conclusions arrived at by this painstaking investigator.

According to Macallum, "the greater part and sometimes the whole of the assimilated iron in the cells of the higher forms of animal life is held in the nucleus, in the chromatin of which it is chiefly found. The chromatin fibrillæ, the chromatin granules, the nodal points of the chromatin network, all exhibit . . . the clearest evidence of the presence of iron. Though no definite comparison is possible, yet, judging by the depth of color resulting from the Prussian blue reaction in a large number of animal nuclei, one may say that the amount of iron thus demonstrated appears to correspond in all cases with the amount of chromatin present." The same distribution of assimilated iron holds good likewise for the nuclei of all the higher vegetable organisms. In the cytoplasm of animal cells, on the other hand, the presence of assimilated iron is the exception and not the rule, although the exceptions are somewhat noteworthy, as the hæmoglobin and hæmatin of the blood, the hæmatoblasts of vertebrates, the enzyme-forming gland-cells of most animals, and yolk-holding ova. In the latter cases, however, with the exception of hæmatin and hæmoglobin, the iron may still exist in combination with chromatin, for as is well known nucleoproteids are to be found to a certain extent in the cytoplasm of cells as well as in the caryoplasm. Even dead nuclein has a strong affinity for iron, and various nucleoproteids have been isolated by vigorous chemical methods with a fairly large content of iron which resists ordinary methods of removal.

According to Macallum the hæmoglobin of the red corpuscles and the analogous compound in muscular fibres are formed from iron-containing chromatin, the only difference between them lying in the fact that the pigment of the muscular fibres does not, in its evolution in the developing ovum, comprehend a stage of nuclear chromatin. "The process by which they are formed is a gradual one and the position of the iron in the molecule is apparently changed. The latter result may be partly accounted for if we consider the composition of chromatin and of hæmoglobin. Chromatin is an iron-holding nucleoalbumin in which the iron is attached to the nuclein, while in hæmoglobin the iron is held in the hæmatin molecule, and in the transformations which result in the formation of hæmatin out of nuclein, it is but natural to expect that the relations of the iron to the molecule should change also.

"In secreting cells, as, for example, those of the parotid, Lieberkünian, and pancreatic glands, a certain portion of the cytoplasm gives evidence of the possession of 'masked' iron. When the cells of the pancreas of an adult Amblystoma are, after hardening in alcohol, subjected to the action of the glycerine and sulphide mixture for six or seven days at a temperature of 60° C., in addition to the reaction for iron obtained in the nucleus, one is found in the cytoplasm of the so-called 'outer zone,' in some cases almost as marked as in the nuclear chromatin. The extent of the cytoplasm involved in the reaction in all specimens which I examined varied considerably, whether according to the stage of secretory activity could not be determined after the use of ammonium hydrogen sulphide, for this reagent, in a day or two at an elevated temperature, causes the zymogen granules to disappear; but in sections of the pancreas from the same animal, after these had been acted on by sulphuric acid alcohol, then with the acid ferrocyanide solution and eosin, the iron-holding area in each cell was demonstrated by the resulting Prussian blue, while the zymogen granules were given an intense red stain, and in this case it was found that, apart from the granular zone, the cytoplasm was uniformly blue In other conditions of activity the iron-holding area was increased or decreased in correspondence with the decrease or increase in the extent of the granular zone. In the exhausted condition of the gland cell, that is, in which there were but few granules, arranged in the 'border' fashion near the lumen of the tubule, the whole of the cytoplasm exhibited the blue reaction, but the latter was less marked than when it was confined to a narrow zone in the neighborhood of the nucleus. The relations of the extent of the iron-holding area to the stage of secretory activity were less easy to determine in the Lieberkünian and parotid glands, for it is not possible to demonstrate the mucigen in the former or the zymogen in the latter as prominently as the zymogen granules may be in the pancreas, but in these the iron-holding area appeared in all cases to correspond, in the main, with the 'protoplasmic' or 'outer' zone. In the 'mucous' cells of the submaxillary gland of the cat and dog, only a narrow zone of cytoplasm about the shrunken nucleus contains iron, but in the large crescents of Giannuzzi in the cat the whole of the cytoplasm is iron-holding. In the peptic tubules of Amblystoma the cytoplasm in the outer half of each cell contains iron, and this is also true of the chief cells in the cardiac portion of the stomach in the dog and cat. In the parietal cells in these animals the cytoplasm is absolutely free from iron. The iron-holding zone in each chief cell appears to vary in extent with the stage of secretion, but I am unable to speak as definitely upon this as upon the relations, in this respect, observed in the pancreatic cells of Amblystoma, for I have not been successful in my efforts to obtain, from examples of the latter animal, preparations of the gastric glands illustrating marked variations in the stages of secretory activity, and have had to rely upon those made from the cat and the dog, in which the chief cells are comparatively small and less favorable for observation on this point.

"It is only in the mucous glands of the skin of amphibia, and in the renal tubules of vertebrates generally, that I find exceptions to the rule that glandular secretion is associated with the presence of an iron-holding cytoplasm. I have not found any exceptions in Invertebrates to this generalization, but my observations have not been comprehensive enough on this point, and I must speak with some reserve in regard to it. In the Protozoa, as I will show further on, the presence of assimilated iron in the cytoplasm seems to be a constant feature, the iron not being confined to any part of the cell, but uniformly distributed through it, and there is a probability that this cytoplasmic iron-holding compound is also associated with the secretion of ferments functioning in the digestion of the ingested food. In the glands named above, which are mentioned as exceptional instances, the absence of assimilated iron from the cytoplasm may be explained on the ground that the secretory process of a renal cell is widely different from that of a pancreatic cell, the cytoplasm in the latter, but not in the former, elaborating a portion of its own constituents to furnish the secretion, whereas in the renal cell the process is largely one of transference only. If the explanation should hold in all possible cases of exception, then it would follow that the iron-holding compound is an important element in the elaboration of the zymogens. I have elsewhere* pointed out the relations that obtain between the chromatin of the nucleus and of the cytoplasm of the pancreatic cell on the one hand, and the formative process resulting in the production of zymogen on the other; and so intimate did these relations appear that I was led to apply the term prozymogen to the chromatin. I have found, as a result of experiments on the active pancreas of Amblystoma, that the zymogen granules under certain conditions give an iron reaction. When the organ, hardened in alcohol, is put in a quantity of Bunge's fluid, and the preparation kept at the temperature of the room (20° C.) for a week, or when it is kept for two days in a quantity of sulphuric acid alcohol, teased-out portions, after the removal of the acid and on the addition of ammonium hydrogen sulphide, give preparations in which the zymogen granules show a greenish reaction, the color making them more prominent than the other elements in the cells. The cytoplasm of the 'outer zone' gives but a feeble iron reaction, and this appears only to a minor extent in the nuclear elements, both results being caused by the lessened action and feeble extractive capacity of the acid alcohols when used on the tissues in mass. When the reagents are used for longer periods than those specified the iron disappears from the zymogen granules, while it becomes more strongly marked in the nuclear elements and in the cytoplasm of the 'outer zone.' Owing to the effect that ammonium hydrogen sulphide exercises on the granules, causing them to dissolve or disintegrate, an effect already referred to above, it is not possible to control the results obtained with the acid alcohols by experiments with this reagent, and we may, therefore, not regard the presence of iron in the zymogen granules as conclusively demonstrated, since it may be urged that the iron reaction which they gave was due to the iron which diffused into them from that liberated in the other cellular elements. When one remembers, however, the fact that the zymogen is elaborated in a cytoplasm which is iron-holding and at its expense, the occurrence of a faint reaction for iron in the granules after the use of acid alcohols is best explained by the view that the zymogen of the pancreas contains iron, and that its antecedent, the prozymogen, is the iron-holding constituent in the cytoplasm of the 'outer zone.' . . .

---

* Contributions to the Morphology and Physiology of the Cell, *Trans. Canadian Institute*, vol. 1, part 2, p. 247, 1891.

"In my observations on preparations of the human thyroid and of that of the dog, although it was easy to demonstrate the presence of iron in the nuclear chromatin, and to a certain extent in the cytoplasm of the cells lining the alveoli, I did not succeed in finding any of it in the 'colloid matter.' Under certain conditions this substance absorbs staining matters, and it also gives[*] the molybdate-pyrogallol reaction of Lillienfeld and Monti.[†] These facts suggest that the colloid substance is allied to nuclein, and, according to Gourlay, the nucleoalbumin which he isolated from the thyroid was derived in large measure from the colloid matter which he, relying on the reaction of Lillienfeld and Monti, found to contain phosphorus. If colloid matter is therefore a nucleoalbumin, its freedom from iron renders it, in contrast with the chromatins, a subject of special interest."

It is very evident from the foregoing that the so-called chromatin of animal and vegetable cells is an iron-containing substance. It is, moreover, equally evident that chromatin does not have a constant and definite chemical composition. Undoubtedly nuclein is its main constituent, but nucleins are well known to be variable in composition, and consequently the chromatins present in various glandular organs will show variable reactions dependent upon the exact nature of the contained nuclein. Similarly, the amount of iron present in a given chromatin may vary, and, indeed, this variation may be dependent upon the nuclein itself. The iron of the chromatin is undoubtedly a part of the nuclein or of the nucleic acid, although it is difficult to say how the iron is disposed in the molecular structure of the nuclein. It may be, as suggested by Macallum, that the iron is united directly to the carbon of the nucleic acid. "The acid alcohols liberate it as a ferric salt, but this fact cannot be held to indicate that it is combined in the nuclein or nucleic acid in a ferric state, since from solutions of potassium ferrocyanide, in which the iron is contained in a ferrous state, acids liberate the iron in a ferric condition, as evidenced by the formation of ferric ferrocyanide or Prussian blue. It is also difficult to say whether there is, in the way in which the iron is held in the animal cell, anything different from that obtaining in the vegetable organism. I have, as a rule, found it easier in the case of the vegetable cell than in that of the animal cell, to liberate the iron with ammonium hydrogen sulphide; but upon this no conclusion may be founded, since the same reagent liberates the iron of free hæmatin readily, while it does not affect the iron of hæmatin in hæmoglobin, and it is possible that in the animal cell the proteid molecules attached to the iron-containing nuclein or nucleinic acid may more greatly affect the activity of the reagent than those of the vegetable cell are capable of doing. Since, on the other hand, hæmoglobin which, as I have pointed out, is derived, in Amblystoma, from chromatin, occurs in a large number of animal forms, but is present in no vegetable organism, it would appear to follow that the iron is combined in animal chromatin in a way unlike that in which it is held in the vegetable cell. . . . Chromatin, to the formation of which the iron absorbed contributes, is, as the results of cytological investigations show, a substance of primary importance to the cell, and a diminution in, or a cessation of, the supply of iron to the vegetable organism, which produces the condition known as chlorosis, instead of affecting only the formation of its chlorophyll, as generally supposed, strikes at its very life.

---

[*] F. Gourlay: The Proteids of the Thyroid and Spleen, *Journal of Physiol.*, vol. 16, p. 23, 1894.

[†] Die Mikrochemische Lokalization des Phosphors in den Geweben, *Zeitschr. f. physiol. Chem.*, Band 17, p. 410, 1893.

"The conditions known as anæmia and chlorosis in the higher vertebrates have been hitherto explained as caused by a diminished production of hæmoglobin directly from organic or inorganic iron compounds absorbed by the intestine from the food matters; but they must now be referred to a deficient supply of the primary iron-containing compound, chromatin, not only in the hæmatoblast, but in all the cells of the body. The consequently lessened proliferation of cell and tissue would explain the hypoplasia of the imperfectly developed vascular system observed by Virchow in chlorotic human subjects. Accepting this explanation of the nature of chlorosis, one may infer that this condition is not limited to animal organisms in which hæmoglobin is found, although its occurrence in others may be difficult to detect because of the total absence of this pigment. From this point of view, animal chlorosis is fundamentally similar to the chlorosis of the vegetable kingdom.

"The oxygen-carrying property of hæmoglobin and of hæmatin is generally attributed to the iron present in these, because when hæmatin is deprived of its iron the resulting compound, whether hæmatoporphyrin or bilirubin, manifests no affinity for oxygen. The proof may not be quite conclusive, for we cannot be certain that either compound represents the unchanged remainder of the hæmatin less its iron, but assuming that it is correct, it follows that the antecedent of hæmoglobin, chromatin, has the capacity of absorbing and retaining oxygen, and that one may attribute the processes grouped under the term 'vital' to an alternation of the conditions of oxidation and reduction in the iron-holding nuclear constituent. This hypothesis, reasonable as it now appears to me to be, I do not regard as free from difficulties, since in vegetable cells the two processes of respiration and assimilation, involving two activities of different natures, so far as the oxygen is concerned, appear to postulate the existence of two different iron compounds in the same nucleus. There are no facts to indicate the existence of such, and it is scarcely possible to explain away the objection without advancing some hypothesis regarding the action of the sulphur and the phosphorus in the nuclein."

METABOLISM IN DIABETES.

By Graham Lusk, Ph.D.,
PROFESSOR OF PHYSIOLOGY, MEDICAL DEPARTMENT, YALE UNIVERSITY.

Hidden within the problem of the cause of diabetes lurks the solution of the question, How does the sugar burn in the body? The study of diabetes has therefore been one of continued interest to the physiologist. In diabetes the organization suffers from a decreased ability to burn sugar, the sugar therefore accumulates in the system, and being a substance which in large quantity is foreign to the blood, the kidney makes effort to remove it. The inability to burn sugar may be partial or complete, resulting in various degrees of affection.

This loss of the power to burn sugar is accompanied by changes in metabolism, as is manifest in the composition of the urine, which may contain, in addition to sugar, largely increased amounts of urea, and, under certain circumstances, there may be detected β-oxybutyric acid, acetoacetic acid, acetone, and noticeable amounts of lower fatty acids (formic, acetic, etc.). These phenomena are all attributable to the non-combustion of sugar. Thus it has been shown (Lusk) that a normal man living on a daily diet of proteid 128.44 grms. (containing 20.549 grms. of nitrogen), of fat 58.54 grms., of carbohydrates 357.37 grms., passed daily in his excreta an average of 19.837 grms. of nitrogen: thus showing, by comparison of nitrogen ingested and excreted, that the proteid given was more than enough to prevent tissue waste. On taking the same amount of proteid and of fat with no carbohydrates, the excretion of nitrogen rose to 27.005 grms. daily. The nitrogen multiplied by 6.25 represents proteid in every case. We see in the first part of the experiment that more proteid was eaten than corresponded to the amount of nitrogen found in the excreta; some proteid must therefore have been retained in the body, and since the difference between nitrogen eaten (20.549 grms.) and nitrogen excreted (19.837 grms.) represents this proteid (*i.e.* 0.712 grms. N) we may calculate (0.712× 6.25) that 4.45 grms. of proteid was each day added to the body. Quite different are the relations in the second part of the experiment, where the carbohydrates are no longer given. Here the daily loss from the body above what is fed to it reaches the equivalent of 6.456 grms. of nitrogen, which corresponds to the destruction of 40.35 grms. of the body's proteid.

The same characteristic metabolism is manifest in the diabetic. Because he has lost the power to burn the carbohydrates his proteid decomposition is above the normal. To a certain extent fat will protect the decomposition of proteid, but not to the same extent as carbohydrates, and then again the intestinal tract is incapable of absorbing fat in the quantity now needed. So we find the fat of the body drawn upon, and the patient gradually loses both flesh and fat in the satisfaction of the needs of his tissue, because he cannot absorb them in quantity sufficient to protect his tissue. A diet of meat and fat may suffice for the Esquimo and other races habituated to it, but in the diabetic, as will be shown, nearly half the energy in the proteid is lost through its partial transformation into sugar. His requirements are therefore abnormally large.

A second point of interest lies in the frequent occurrence of β-oxybutyric acid, acetoacetic acid, acetone, and the lower fatty acids in the urine of patients suffering from severe forms of diabetes. The substances may all be obtained from the chemical treatment of sugar, and at first thought might be attributed to its abnormal decomposition, but further investigation leads to the belief that this cannot be so. These bodies are found in the urine whenever there is decomposition of the body's own proteid. This is strikingly illustrated in cases of inanition, and experiments (by Zuntz) made on Cetti, the starvation artist, showed that acetone was present in the urine from the first day of fasting, and that acetoacetic acid appeared on the third day, the two continuing present till normal food was given on the tenth day, when they immediately disappeared. The presence of these substances is noticed in leucocythemia, fever, and whenever decomposition of organized proteid goes on. The source of β-oxybutyric acid, acetoacetic acid and acetone seems to be a common one, for on feeding β-oxybutyric acid, the other two, acetoacetic acid and acetone, appear in the urine (Minkowski, Araki) the reactions for which may be written thus:

$$CH_3-CHOH-CH_2-COOH+O=$$

β-oxybutyric acid

$$CH_3-CO-CH_2-COOH+H_2O$$

Acetoacetic acid

$$CH_3-CO-CH_2COOH=$$

Acetoacetic acid

$$CH_3-CO-CH_3+CO_2$$

Acetone.

Only in the more severe forms of diabetes does β-oxybutyric acid appear in the urine, it being usually oxidized into one of the other two bodies.

The increased amount of lower fatty acids present in the urine in diabetes is likewise believed to be the accompaniment of the abnormal decomposition of the organized proteid and contributes to increase the acidity of both urine and blood. The acidity is, of course, still further increased by the production of sulphuric and phosphoric acids from the oxidation of the sulphur and phosphorus-containing proteid. The final acid intoxication which results in *coma diabeticum* has been ascribed to a large production of β-oxybutyric acid, though this is not clearly demonstrated. A case related to me by Dr. E. L. Munson instanced a diabetic fed on proteid diet who had marked cerebral symptoms, which disappeared on feeding a mixed diet. In this case the partial burning of ingested carbohydrates served to diminish the decomposition of organized proteid, thereby diminishing the production of the toxic acids.

There are several methods by which sugar may be made to appear in the urine, and among them may be mentioned the irritation of the "diabetic centre" in the medulla, the extirpation of the pancreas, and the administration of phloridzin. The first does not give a true diabetes, but is due to an irritation which affects the vasomotors of the liver, causing a sudden removal by the blood of the glycogen stored there, and the resulting excess of blood-sugar is removed by the kidney. If no glycogen be present in the liver the experiment is unsuccessful. The second form of artificial diabetes is called "pancreas diabetes," and has been thoroughly investigated by Minkowski. After a complete extirpation of the pancreas in dogs, there sets in a typical diabetes in its severest form. If the dog in such condition be starved, the blood will be found surcharged with sugar, and the urine will contain sugar and nitrogen in the nearly uniform proportion of two and eight-tenths is to one (Dextrose : Nitrogen : : 2.8 : 1). The dextrose does not come from fat, and must therefore come from proteid decomposed. Likewise on feeding proteid to such dogs the same relation between sugar and nitrogen is maintained. Furthermore, if dextrose be given subcutaneously to the dogs it reappears in the urine gram for gram. So the diabetes is complete—that is, the body has lost the power of burning the ordinary blood-sugar, dextrose. Such dogs were, however, able to burn levulose, as had been likewise shown by Fr. Voit in a case of human diabetes. Levulose fed to the diabetic dogs increased, however, the dextrose in the urine to an extent of about fifty per cent. of the levulose fed, which corresponds to the well-established fact that levulose is in part changed into dextrose by the liver. Still, we have the important knowledge that the diabetic organization still retains the power to burn levulose. What the pancreas manufactures and gives to the blood and tissues, thereby causing oxidation of the sugars, is unknown, and speculation upon it is hardly consistent or profitable within the limits of this article. It is therefore left to the reader to imagine it as a "catalytic agent" or an "oxygen carrier" as he wills. Dogs with pancreas diabetes ultimately die in *coma diabeticum*, with the same characteristics in blood and urine of acid intoxication as in *diabetes mellitus*.

The third cited example of artificial diabetes was first produced by v. Mering after administration of phloridzin to man and to animals. Contrary to other forms of diabetes the amount of sugar in the blood is reduced by the phloridzin. Thus Minkowski in his fasting dogs with the established ratio before mentioned, D : N : : 2.8 : 1, was able after administration of phloridzin to suddenly obtain the ratio D : N : : 10 : 1, with accompanying sinking of the per cent. of blood-sugar. Phloridzin acts therefore to sweep the sugar from the blood. Cremer, experimenting on starving rabbits, found that the sugar in the urine was proportioned to the nitrogen, that is to the proteid decomposed. He injected phloridzin every twenty-four hours.

The subject of phloridzin diabetes is one which has been of considerable interest to me, and in my work I have been greatly aided at different times by the valuable assistance of Dr. E. L. Munson, Dr. E. A. Lawbaugh, and Mr. I. M. Heller. It is possible here only to touch upon the salient points of our investigations.* The administration of phloridzin to starving rabbits in small doses at frequent intervals (every six to twelve hours) at first sweeps the blood-sugar into the urine (example, D : N : : 5 : 1), but on the second day gives a ratio between sugar and nitrogen in the urine approximating that of Minkowski, *i.e.*, D : N : : 2.8 : 1. The explanation of this is simple. Long ago Voit stated that proteid fell in its first decomposition into two radicals which he termed the nitrogenous and the non-nitrogenous. The first was rapidly decomposed, appearing in its greater part as urea in the urine fourteen hours after feeding (Feder). The non-nitrogenous portion of decomposed proteid took twenty-four hours for its carbon to be completely eliminated through the lungs. Now this non-nitrogenous portion consists, in part at least, of sugar, and we have here the explanation of the presence of sugar in the blood and organization even during starvation. Phloridzin suddenly removes this, and thereafter removes all sugar as soon as produced, giving the ratio mentioned as above and strongly confirming the experiments of Minkowski.

---

* The full details will appear in the *Zeitschrift für Biologie.*

A clearer interpretation of the metabolism of proteid we may obtain from the following table made by Weintraud and Laves :

100 gr. Proteid =	54.1 gr. C ;	7.3 gr. H ;	16.1 gr. N ;	21.5 gr. O_2
34.5 gr. Urea =	6.9 gr. C ;	2.3 gr. H ;	16.1 gr. N ;	9.2 gr. O_2
	47.2 gr. C ;	5.0 gr. H ;		12.3 gr. O_2 + 11.74 gr. O_2
45.08 gr. Dextrose =	18.03 gr. C ;	3.0 gr. H ;		24.04 gr. O_2
	28.17 gr. C ;	2.0 gr. H.		

The constituents of urea belonging to one hundred grms. of proteid were first subtracted. The amount of dextrose formed when two and eight-tenths grams are produced to every one gram of nitrogen, amounts to 45.08 grms. for every 100 grms. of proteid, and furthermore we notice from the table that this process must be one of oxidation with consequent evolution of heat, though the quantity of the heat produced we are unable to calculate. But the heat value of 45.08 grms. of dextrose we may very readily calculate, since one gram of dextrose burning in the body yields 3740 calories (Stohmann), that is to say an amount of heat able to raise 3740 grms. of distilled water from 0°C to 1°C. The heat value of the 45.08 grms. of dextrose derived from 100 grms. of proteid is, therefore, 3740 × 45.08 = 168,599 calories. The total heat value of 100 grms. of organized proteid burning in the starving body is 380,000 cal., calculated according to Rübner. This shows us clearly that 44.4 per cent. of the total energy contained in proteid is furnished by the sugar, which is split from it. This process in the animal is the antithesis to that in the plant, where proteid is probably built up synthetically from sugar and amido bodies.

Dextrose fed to a rabbit with phloridzin diabetes may somewhat increase the sugar in the urine, but may in large part be burned. The body does not therefore lose the power to burn sugar, but the phloridzin itself, perhaps through chemical union with the sugar, seems to be able to protect it from decomposition.

The only remaining point upon which I will speak here is the theory of the action of phloridzin, and of this I can make no certain statement. The drug is a glucoside, yielding phloretin and sugar on boiling with acids. It is said to appear quantitatively in the urine (Cremer). Phloretin when administered likewise produces glycosuria. Minkowski's theory is that phloridzin is decomposed in the kidney into sugar which passes in the urine and into phloretin which unites with more sugar in the organization and thus brings it to the kidney. Gradually the phloridzin may be given to the urine, and when all has passed the action ceases. A synthesis within the body of phloretin and sugar would not be dissimilar to the synthesis, after feeding chloral hydrate, between the trichlorethyl alcohol formed from it and dextrose, though here the dextrose is subsequently oxidized to the glucuronic acid radical, the whole compound being urochloralic acid, or trichlorethyl glucuronic acid. If the synthesis between the phloretin and sugar took place in the body, then after establishing with phloridzin ratio (D : N : : 2.8 : 1) we might on venous injection of phloretin make the sugar in the urine disappear or decrease in quantity. But in repeated and careful experiments neither Dr. Lawbaugh nor Mr. Heller have been able to attain such results.

The subject is full of interest and suggestive of future lines of research.—*Yale Med. Jour.*

INFANT FEEDING—A REVIEW.

By A. Jacobi.

Nothing has been more successful in removing the dangers of intestinal disorders and the sources of excessive mortality in the last decade than the widespread custom of sterilizing (or pasteurizing) cow's milk. Both are the logical development of treating milk by boiling, which the author has persistently advised for the last 35 years.

Boiling expels air. It destroys the germs of typhoid fever, Asiatic cholera, diphtheria, and tuberculosis; also the oidium lactis, which is the cause of the change of milk-sugar into lactic acid and the rapid acidulation of milk, with its bad effects on the secretion of the intestinal tract. Some varieties of proteus and most of the bacteria coli are rendered innocuous by boiling.

But diarrhœa is only a symptom of many causes, and cholera infantum itself is a name for many conditions. Babies at the breast are subject to cholera infantum, particularly in Southern climates and in public institutions.

The influence of external temperature is a very important factor. Babies taken suddenly from a hot railroad car to the deck of a lake steamer, from a warm bed to a draughty room, may develop a catarrhal enteritis. The morbid condition of the epithelium caused by such sudden changes is the important cause of disease, because it opens the way to all sorts of infecting substances, whether they are poison in cow's milk or indigestible baby foods.

Germs of disease, according to Schild, may be found in the intestine of the newly born in 10 to 17 hours after birth. The meconium, originally sterile, is soon infected through the mouth and anus, from the linen, the bath, the air, and the blood itself. Even breast-milk is not free from danger, bacteria having been frequently found in healthy breast-milk even when no mastitis or other local disease was present.

A not uncommon germ, the so-called hay or potato bacillus, frequently found in dirty stables, and for that reason in milk from dirty cows, cannot be destroyed by ordinary sterilization without affecting the nutritious qualities of the milk. This in pure cultures causes diarrhœa in dogs and peptonizes casein. These various dangers do not render futile the process of boiling milk, but merely indicate the danger of relying on a single preventive when there are so many causes for intestinal disorder.

Daily home sterilization is far preferable to risky purchase from wholesale manufacturers who cannot guarantee, because in the nature of things they cannot know the condition of their wares. The fermenting process is not always stopped by sterilizing, and butyric acid may be found in place of lactic acid, and gas produced giving rise to flatulency, even in the most elaborately sterilized milk.

Cream is often separated from sterilized milk which is exposed for sale, and this is very undesirable. At best the sterilization of milk will not transform cow's milk to mother's milk, for there is a chemical difference between the casein of the cow's and woman's milk. Cow's casein precipitates a "paranuclein" undissolved and undigested, after pepsin digestion, while the casein of woman's milk retains its "nuclein" in solution and is fully digested, and contains also an additional albuminoid not identical with either known casein albumin.

For this reason exclusive use of sterilized cow's milk will not infrequently produce constipation or diarrhœa, or even rachitis or scurvy in a young infant.

In order to finely divide and suspend the casein in cow's milk, and to add a nutritious element, cereals should be added even in the first days of infancy.

The author advises a free dilution of milk with 4 to 5 parts oatmeal or barley water to act in this mechanical way on the casein, to meet the extra demands of a growing infant for water, to avoid the danger of uric-acid infarcts and other renal complications, which are by no means uncommon, and also to assist in pepsin digestion.

The methods of pasteurization as developed by Freeman, and of modifying milk, as carried on by Rotch and others in the scientific milk laboratories of Boston and elsewhere, deserve the highest recommendation.

The centrifugal method of separating cream and milk carried on in these laboratories is valuable, for it makes it possible to produce an exact standard and safe grade of milk and cream, and thus makes the production of a carefully prepared milk in definite percentages of strength possible.

By producing on demand milk of any percentage of strength and composition, it is possible to meet the varied requirements of different infants.

The early use of a little animal broth or juice of milk and at times small doses of phosphorus (elixir phosphori), if after careful feeding the formation of muscles and bone is slow, is advisable.—*Amer. Med.-Surg. Bulletin.*

NEGATIVE HISTOLOGICAL EXAMINATION OF THE BLOOD AS A FACTOR IN DIFFERENTIAL DIAGNOSIS.*

By Walter A. Wells, M.D.,
of Washington, D. C.

The very evident tendency of modern medicine to give greater prominence to those so-called clinical examination methods—physical, chemical, and microscopical—ought not, I think, to be construed as an effort to disregard, or even belittle, the value of close observation of the outward manifestations of disease, nor of the indispensable admission occasionally of anamnestic data.

We cannot fail to observe, however, that the latter functions are, with the progress of medicine, losing, in comparison with the former, their importance in the diagnostic art. To-day, instead of placing our chief reliance in history and symptoms, as did the earlier practitioners, we have relegated these to a somewhat subordinate position, and are inclined to pin our faith, rather, in the stethoscope, microscope, and chemical reagents.

These, it cannot be denied, are more precise, definite, and constant means, and are justified accordingly, from a scientific standpoint, in receiving the high place which has been accorded them.

It is only very recently that methodical examinations of the blood have been made to serve the practical clinician; but there has been made in this short time such rapid and profitable advance, carrying with it such alluring promises of future possibilities, that there have appeared upon the field a succession of earnest and enthusiastic investigators, who have made and are continuously making valuable contributions in hematological studies. Would the medical practitioner but avail himself of those facts which stand confirmed by repeated observation, there would be certainly less excuse, if any at all, for ever confounding certain diseases which, without this aid, cannot be differentiated at times, even by the best diagnosticians; for example: pneumonia, in its commencement, from typhoid; typhoid from malaria; or even measles from scarlatina.

By the natural limitations of this paper, I am denied the consideration of the blood in various diseases, and even such instruments as the hemometer, hemaglobinometer, and hematocytometer. What information, then, is gathered by a mere examination of a specimen of blood under the lens? Beginning, as we should, with the fresh or native preparation, we may note the *rouleau* formation of the red blood-corpuscles, the fibrin formation in the plasma, the condition of the leucocytes, especially as to amœboid movement; the presence or absence of the plasmodium, better termed *hematobium malariæ.*

In the colored specimen we direct our attention first to the red blood-corpuscles. Are they altered in: (*a*) size, constituting the so-called poikilocythemia? If so, do the microcytes (or smallest sized), megalocytes (large sized), or gigantocytes (excessively large sized) prevail? (*b*) Is poikilocytosis,* or, as Ehrlich prefers to designate it, schistocytosis, present? and if so, to what degree? (*c*) Are the erythrocytes abnormal as to the amount of coloring-matter contained in their discoplasma? We observe the size of the central dell. An alteration in the coloring-matter is designated polychromemia; and some writers term chlorotic those corpuscles which are poor in hæmoglobin. (*d*) Are there present the nucleated erythrocytes, forms which do not occur at all in normal blood? If present, it is of importance to note whether the normoblasts only are present, or whether the mesoblasts, or yet more important the gigantoblasts, are to be seen. The leucocytes may next claim our attention. (1) An increase in their number can be detected through microscopical examination. There should be, according to Neudorfer, one leucocyte in about every fifth field. The presence of 1 to 2 leucocytes in the field constitutes a mild leucocytosis, 3 to 5 a moderate, and 5 to 10 a considerable. (2) We should, moreover, examine in reference to the relative distribution of the leucocytes, the preponderance of one or the other of the various forms constituting, respectively, a polynuclear leucocytosis, a lymphocytosis, or an eosinophilia. (3) Examination as to the number of the blood-plaques or hematoblasts; (4) as to the presence of the perinuclear basophiles; (5) as to the karyokinesis or karymytoses (the mitoses of Müller); and lastly (6) we may seek for micro-organisms, though this usually requires special staining, and is only exceptionally required. The blood must present then a normal condition in respect to all these in order that we may say that the histological examination yields a negative result. There are some diseases in which this is essentially the case which may therefore, I think, be fittingly discussed under this heading.

---

* Read before the Clinical Society of the District of Columbia, January 13, 1896.

In the commencement, let me state, it must not be supposed that a negative, that is to say a histologically normal, specimen can mean only a normal condition of the blood. On the contrary, there may be present a not inconsiderable anæmia, which, because it does not extend to alterations in the character nor the relations of the elements, is not discoverable upon microscopical examination. Such may be the case in the so-called quantitative anæmia, where, as it were, there is a general impoverishment of the circulating medium, an anæmia in bulk, a parallel deprivation of all the elements without any disturbance of their relation to one another. In such an anæmia we have therefore a color index represented by 1. We can illustrate this better, perhaps, by stating concrete cases. Let us suppose before us two individuals, both evidently suffering from a serious, exhausting illness, grave pathological condition of the internal organs, both being weak, emaciated, cachectic, and very pale, and there may or may not be signs pointing to a definite localization of trouble in lungs, liver, spleen, or other organ.

We take a specimen of blood from the one case, fix and stain orderly with, say, eosin-hematoxylon, and what do we find? In addition to an augmentation in the number of leucocytes, there are alterations of a high degree in the elements. There is poikilocytosis, poikilochromemia, megalo- and micro-cythemia, and we observe in the field also a number of nucleated erythrocytes. We now prepare a specimen in like manner from the other case and proceed to examine.

We see a different picture, and one that we may not have expected, in the case of an individual so manifestly anæmic, with pale face and bloodless mucous membranes.

We can observe no signs of anæmia in this blood upon microscopical examination, the leucocytes and erythrocytes are present in their normal relation to one another, and there are no departures from the normal as regards size, shape, or coloring. This patient is the subject of tuberculosis; the former has the blood characteristics of carcinoma.[*]

---

* Whether poikilocytosis is, as Maragliano's experiments seem to prove, but a form of necrobiasis artificially produced outside of the body, or not, does not alter its significance from a clinical point of view.

We have, in this case, to regard the poikilocytosis as a measure of the corpuscle's vitality.

It is true that if we had used the Ehrlich tri-color stain we would in all probability have noted a deviation from the normal, because then it would be seen that the perinuclear basophiles of Neusser,[†] which are normally present, either failed or at least were lessened in number.

If we should proceed to the count of the corpuscles and to a measurement of the hæmoglobin, the calculation of the color index [‡] will result, as a rule, in 1 or thereabout, seldom less than .8.

It is surprising, as Grawitz [§] has shown, how little may be the reduction in the number of erythrocytes in tuberculosis, in spite of the apparent anæmia. This he believed to be due to the peculiar effect of the absorption of tuberculous products, causing a condensation of the blood. His experiments upon animals demonstrated that injections into the veins of tubercular masses produced increased specific gravity of the blood, whereas the injection of extracts from cancer caused decrease of the red corpuscles and solid constituents of the blood.

The absence of the nucleated erythrocytes is one of the most important negative features of tuberculosis, especially as it is in this so distinctly opposed to cancer. It has been observed they are absent, or at least quite scarce, even after hemoptysis in tubercular subjects, although commonly a feature of anæmia following hemorrhage. Tuberculosis is, therefore, in its exemption from the erythroblasts, distinguished not only from cancer, but likewise from progressive pernicious anæmia, leukæmia and anæmia infantum, pseudoleukæmia, and the anæmias of tertiary syphilis and phosphorus-poisoning.

A second important negative feature of tuberculosis is the absence of leucocytosis.[*] Limbeck was, upon the strength of this single fact, enabled in three cases to make the diagnosis of tubercular meningitis, in contradistinction from the primary suppurative form, in which leucocytosis, usually of an intense degree, manifests itself, and found his diagnosis substantiated by autopsy. These observations, confirmed later by von Jaksch,[†] cannot easily be overestimated, on account of the evident bearing upon prognosis.

An interesting negative feature of the blood in tuberculosis is the absence of an increase of the fibrin-net—interesting because tubercular disease of the lungs runs sometimes the course of a pneumonia. The latter affection is marked as well by a high degree of polynuclear leucocytosis as by its great increase of fibrin. It seems that the Koch bacillus, unlike the diplococcus, retards the formation of the fibrin, and that it is less, therefore, in those cases of croupous pneumonia developing in tubercular individuals.

There almost never occurs eosinophilia in tuberculosis,[‡] and this fact may also be made use of in differentiating it from certain affections in which an increase of these elements is the rule, namely, Graves' disease, myelogenic chlorosis, intestinal parasites, leukæmia, nephritis, chronic malaria, and primary essential emphysema and asthma.[§]

We have pictured in the foregoing only the uncomplicated disease. It may be profitable to recall here briefly some of the modi-

---

[*] It has been maintained by Bard that the blood may be independently the seat of cancer, and he has advanced the unique theory that leukæmia is cancer of the blood.

[†] Ueber einer besonderer Blutbefund bei urathischer Diathese, *Wiener klinische Wochenschrift*, 1894, vii., 727.

[‡] The color index may be quickly estimated by dividing the number of red blood-corpuscles by 5,000,000, and then dividing the per cent. in hæmoglobin by the result obtained.

[§] *Centralblatt für Innere Medicin*, no. 15, p. 334.

---

[*] Rieder: Beitrag zur Kenntniss der Leukocytose und verwandte Zustanda des Blutes, Leipsic, 1892. Sadler: *Fortschritte der Medicin*, Berlin, v., 10, 1892. Limbeck: *Schmidt's Jahrbücher*, Leipsic, March 15, 1894. Peck: *Wiener medizinische Presse*, 1891, June 29.

[†] R. von Jaksch: Ueber Diagnose und Therapie der Erkrankungen des Blutes, *Prag. med. Wochenschr.*, 1890, nos. 31 and 33.

[‡] N. B. Botkin and Bischoff have seen considerable increase of eosinophiles after injections of tuberculin.

[§] Some authors have failed to find an increase of eosinophiles in the blood in asthma, but Gabretschewsky (Klinische Hematologischen Notizen, *Archiv f. experim. Pathol. und Pharmakol.*, 1890–91, 28) reports three cases in which the per cent. was 9, 10, and 22 respectively. At any rate the sputum of asthmatics (Gollasch zur Kenntniss des asthmatischen Sputum, *Forthschritt d. Med.*, no. 10, 1889) will contain copious quantities of eosinophiles, which are always wanting or very scarce in tubercular sputum.

fications in this typical case which can occur by reason of complicating conditions. We may see a chlorosis of red blood-corpuscles where there have been: (*a*) hemorrhage, (*b*) excessive diarrhœa, in (*c*) conditions giving rise to a great loss of albuminates, and (*d*) in case of complication with chlorosis.

A polynuclear leucocytosis in the course of tuberculosis pulmonum should awaken a suspicion of extensive cavity formation. A lymphocytosis may exist as the expression of a quite general involvement of the glandular system. Very rarely one may have the type of a pernicious anæmia. This could occur from the coexistence of sepsis, amylosis, nephritis, or carcinoma.

We pass next to the consideration of one of the essential fevers, the blood of which, though not in every respect normal under the microscope, yet at least presents negative features which mark it so clearly from others of its class as to entitle it to consideration under this head. I refer to typhoid fever, a disease in which all possible aids toward a diagnosis are to be welcomed, as the best clinicians confess themselves at times unable to make an early diagnosis. The most noteworthy negative feature of typhoid fever is the absence of a leucocytosis. Halla,[*] in 1883, made the general observation that febrile diseases were accompanied by the phenomena of leucocytosis. Limbeck,[†] at a later date, pointed out that leucocytosis occurred in only those inflammatory affections attended by exudation into the tissues, and mentioned typhoid as an affection exempt. This fact has been emphasized by Rieder,[‡] Chetagraw, and Felsenthal,[§] and amply confirmed by clinical observation. Very often it is found, indeed, that the number of the leucocytes is under the normal; that, instead of a leucocytosis, there is a leukopenia. The decrease is at the expense of the polynuclear element, which may fall at the critical stage to 20 per cent., instead of their normal 64 per cent.; whereas the proportion of lymphocytes may rise to 50 per cent. instead of their normal 28 per cent. This relative lymphocytosis does not occur, however, until the second or third week. The diagnostic importance of a normal or, as the case may be, lessened number of leucocytes occurring in typhoid is seen when we know that but three other febrile affections present a similar condition of things, viz., measles, malaria, and tubercular meningitis.

We can easily exclude pneumonia, an affection marked by an intense leucocytosis. It also differs from pneumonia in showing no fibrin development. Malaria, even if search for the plasmodium should be negative, has positive signs in the usually found increase of pigment, hematoblasts, and eosinophiles. Endocarditis maligna, presenting at times a picture very difficult to distinguish from typhoid fever, may be excluded if leucocytosis be absent; so also any form of sepsis.

If, finally, from other symptoms, an irrefutable diagnosis of typhoid is justified, we must conclude a complication exists, as nephritis, pneumonia, otitis, parotitis. A polynuclear leucocytosis in the later stages —fourth or fifth week—may find its explanation in extensive ulcerations in the intestine that do not heal.

Measles, as already stated, presents a blood-type not unlike typhoid.

In the tendency toward a low number of leucocytes, especially of the eosinophiles, which Felsenthal found never over 1 per cent. (lowest normal limit), mark it very strongly against scarlatina, in which Katschetkoff[*] has found always leucocytosis, which at times reached 30,000, and in which eosinophiles varied from 8 per cent. to 15 per cent.

Other affections may be mentioned where the blood is essentially normal, as in primary syphilis, icterus neonatorum,[†] morbus maculosus Werlhofii, scorbutus (signs of regeneration in blood being usually wanting),[*] and benign growths; which facts may be of real use at times for diagnosis.

---

[*] Ueber den Hämoglobinsgehalt des Blutes und die quantitative Verhältnisse der rothen und weissen Blutkörperchen bei acuten fieberhaften Krankheiten, *Zeitschrift für Heilkunde*, 1885, v., 4.

[†] *Schmidt's Jahrbücher*, Leipsic, March 15, 1891.

[‡] Die pathologische Anatomie des Blutes bei Typhus abdominalis, Dissert., Petersburg, 1890.

[§] Hematologische Mittheilungen, *Archiv f. Kinderkrankheiten*, Stuttgart, 1892–93, xv., 78.

[*] Katschetkoff, Die morphologische Blutveranderungen bei Scharlach, *Wratsch.*, no. 41.

[†] Fischl zur histologie des Kindliches Blutes, *Zeitschrift für Heilkunde*, v., 13, p. 277.

For instance, a dilatation of the gall-bladder or a hydronephrosis could in this be at least distinguished from echinococcus, because the latter is attended with eosinophilia.

In conclusion, I will mention an instance of negative examination of the blood leading directly to diagnosis, under circumstances somewhat unique, at a time when I was engaged in hematological studies at Neusser's clinic, at Vienna:

"A female patient, age 25, was admitted to the wards, whose history was briefly as follows: As a child, had rickets, measles, scarlet fever; menses began at 17 years, and have since been regular and normal.

"At age of 13 suffered much from gastric troubles, for which she was under treatment in hospital seven months; vomited after eating, often a quantity of blood; had distaste for sour food.

"Present attack began three weeks after admission, and is similar to the former. Vomiting comes on ten to fifteen minutes after eating, and several times the patient declared there had been copious admixture of blood. There was tachycardia; respiration 58."

A provisional diagnosis of ulcus ventriculi was made in this case, and I undertook an examination of the blood, expecting to find the alterations belonging to a post-hemorrhagic anæmia; that is to say, in addition to slight leucocytosis, some nucleated red blood-corpuscles, a predominance upon the field of microcytes, and an increased number of the so-called hemoblasts, or blood-plates of Bizzozero,[†] but, to my astonishment, these changes were not to be seen, and the result of a thorough analysis was a normal condition of the blood.

The following day the case was demonstrated by Neusser in the lecture-room, and diagnosis was reached of hysteria, with hysterical vomiting, the vomiting of blood, which had not been seen by any one else, being discredited on the strength of a failure of post-hemorrhagic changes. Neusser laid chief stress upon the hematoblasts, which he holds to be important signs of regeneration in the blood, and whose presence in large numbers, therefore, he regards as favorable. He believes them to arise from the shed-off epithelium of the vessels; differing from Bizzozero, who thought they arose from the destruction of the white and red blood-corpuscles, and Löwitt, who supposed them to be the products of the destruction of the leucocytes or precipitates from the plasma, and therefore degenerative changes. According to Hayem, they are steps in the formation of erythrocytes. At any rate, their presence is not to be expected until a day or so after the loss of the blood.

The diagnosis in the case in question was corroborated by the discovery of the so-called hysterical stigmata. An interesting feature was the absence of hydrochloric acid from the stomach secretions.

If I have succeeded in demonstrating that blood analysis is more frequently demanded than was formerly supposed, and may be helpful to diagnosis at times, even though negative in its result, and have thereby added any incentive for greater attention to that department of investigation which certain observers believe offers a hopeful medium for the solution of many dark problems in physiology and pathology, then my object in presenting this paper has been accomplished.—*Med. News.*

PREMATURE OCCUPATION OF NEW HOUSES; A TEST FOR RELATIVE HUMIDITY OF HABITABLE APARTMENTS.

The sanitary writer for the European edition of the *Herald* treats of the disadvantages and dangers arising from dampness of the domicile. Regarding newly built houses he says: "Sanitarians, for the most part, teach us that a period of four months in summer and six months in winter ought to be allowed between the end of the building operations and the entrance of the inhabitants in a house. In this way will be avoided the accidents that arise from the premature occupation of an apartment. It is scarcely necessary to add that as soon as the house has begun to be occupied, to avoid dampness, it should be heated and ventilated, treated, in a word, by all the usual means to maintain a healthy condition of the apartment. If the dampness persists in spite of all these precautions, the proprietor is responsible for the defects in his building. Physicians are sometimes requested to estimate the relative dampness of an apartment or room. This is not always easy by simple inspection, as a room may be damp although saltpetre does not grow on its walls or mould in its corners. The following is an exact means of appreciation and one that is within every one's scope. In the room in question a kilogram of fresh lime should be placed after hermetically closing doors and windows. In twenty-four hours it should be weighed, and if the kilogram has absorbed more than 10 grams of water (that is, more than 1 per cent.), the room should be considered damp and classed as unhealthy. The question of the dampness of dwellings is a frequent cause of dispute between landlord and tenant, naturally solved in the affirmative by the latter, and in the negative by the former. The question can be settled in the future by the test of the hydration of lime, of which I have just spoken, and which will give irrefutable proof or refutation of the validity of such complaint. The dampness of dwellings is a cause of illness. The death-rate is greater in quarters where the apartments are damp than where they are dry. Ventilation is defective where the walls are impregnated with water; the porosity of the walls is done away with and can only be re-established after the evaporation of the water has been completed, and the heat required to effect this evaporation is furnished by the person living in the room. This is the cause of the vivid impression of cold which we experience in damp places, and it is a well-known fact that exposure to the action of cold renders the organism more accessible to the attack of morbid germs. The rotting of walls, which appears particularly in places where the water used in building contained nitrates and chlorids, is caused by changes from dryness to dampness and *vice versa.* It gives rise to fragmentation of the mortar and even of the building stones themselves. Finally, frost can split a wall that is soaked in moisture.

---

[*] Neusser's Lectures are my authority for this and many other statements where no reference is given.

[†] Bizzozero and Salveoli: Ricerche sperimentali sull' ematopoesi Splenica, *Archivio scienze Mediche*, vol. iv., no. 2.

"The dampness of dwellings is due to internal or external causes. There can be no doubt that a new building ought to be treated for a certain length of time by ventilation and heat with a view to evaporating the really enormous amount of water incorporated with the building materials. According to Pettenkofer, a three-story house requiring 167,000 bricks would need some 835,000 litres of water to build. When this evaporation has been effected great care should be taken in insuring proper drainage for rain and other water."—*Jour. Am. Med. Ass'n.*

Department of Hygiene.

WITH SPECIAL REFERENCE TO STATE AND PREVENTIVE MEDICINE.

Edited by E. O. Shakespeare, M.D., Ph.D.,

(PHILADELPHIA.)

SOME MUCH-NEEDED IMPROVEMENTS IN BICYCLES.

The wide popular use of the bicycle at the present time by young people and adults, male and female, whether in sport, recreation, exercise, or business, calls for careful criticism on the part of physicians and hygienists of the prevalent faults of riders and manufacturers.

The faults of riders may be divided into two general classes: those of a position essentially bad and injurious, and those of imprudence in the use of the machine. The faults of manufacturers, for which they are especially blamable, chiefly relate to the construction and adjustment of the saddle.

As to the faults of youthful riders, the head of the family and the family physician can do much to eradicate them. In the first place, the so-called "racing-model" should be absolutely interdicted to the developing youth. He should use no machine unless with saddle and handle-bars so adjusted that the position on the wheel will keep the backbone nearly perpendicular and the arms more or less limber, allowing free expansion of the chest; and he should be forbidden the silly pastime of "the scorcher," and advised to walk up a stiff hill rather than pump out his heart and lungs by attempting to climb it. The overstrain of the heart in such foolhardy exercise is pernicious in the extreme for young people whose muscles and bones are in the tender stage of development; and it is no less reckless for their elders to indulge in it who may be the unconscious subjects of a weak or deranged heart. In fact, any use of the bicycle which approaches muscular or nervous exhaustion is bound to prove injurious in the long run. While the same may be said of any exhausting exercise, it is doubly true of the bicycle, which makes its chief draft upon the heart. The crouching position on the wheel, so commonly observed among young riders, is bound to lead to a curved back, stoop shoulders, and flat chest in adult life. The arguments advanced by bicycle salesmen to persuade their young customers into the purchase of their "popular model" should not mislead a judicious or thinking adult. The basis of all such arguments is that the crook'd back and low handle-bars give increased power over the wheel for hill-climbing. Well, what of it? Is hill-climbing to be the chief aim and pleasure of the rational bicyclist? Must the reasonable being who rides for comfort, pleasure, and health be forced into a bad and injurious position on his wheel for miles on a level or gently graded road in order that he may have a supposed better purchase against which to pull and push when he encounters an occasional hill? This pretence, catching as it is with the thoughtless, is the merest "bosh," and scarcely merits the space accorded it were it not that it has inveigled many a callow youth and impressionable man into purchasing a wheel that is bound to do him an injury. It would be just as logical to walk around stooping half the day in order to be in the proper position to pick up a two hundred pound weight once or twice. The riter rides for pleasure and health, on such wheel as obliges him to maintain the pright position, and he has encountered o hill yet which others climb that he is nable to go up on his wheel. And to his stimony may be added that of numerous ther road wheelmen who ride in the strictly pright and only truly hygienic position.

It was our intention, however, to discuss e bicycle at this time only from those andpoints relating to health. The GAETTE has several times already considered e wheel in its general relations to health nd disease, and has on one or two occaons vigorously condemned most of the ddles in use, especially for female riders. Ve shall not here repeat our former general emarks, but shall limit ourselves to pointg out wherein all standard wheels have iled more or less completely to meet most nportant hygienic requirements.

We name these failures in the order of heir hygienic importance : 1st, the lack of perfect anatomical and harmless saddle ; d, the lack of devices to completely overome vibration and hammering of the perieum ; 3d, the lack of perfect devices for he climbing of considerable, long ascents ithout unduly straining the heart.

1. The lack of an anatomical and perectly harmless saddle. We may assert, ithout risk of reasonable contradiction, at this is a very serious failure of manuacturers to meet health requirements in the utput of their factories. There are only wo saddles — quite new ones — of which e have any acquaintance which at all losely approach an anatomical model, and ven these are at present far from perfect their adaptation to the anatomy of the arts which should or should not receive upport or pressure from the saddle. Nearly ll the other numerous forms of bicycle sadle may be regarded as more or less decidly harmful if used much for years. The ery first essential of a harmless saddle for male to ride is that there should be no ressure whatever upon the location of the rostate gland and the urethra ; an equally nportant essential of a harmless saddle for e female to ride is that there should be no pressure whatever upon any portion of the vulva. One of the two saddles above mentioned possesses both these essentials to perfection, being equally adaptable anatomically to male or female ; the other of the two possesses them to a much smaller degree, and in this respect is much the more imperfect. On the other hand the less perfect of the two, in the respect above mentioned, has a much better adaptation of outline and moulding where the junction of the inner and rear aspect of the thigh with the buttock comes in contact with the outer edge of the saddle ; it therefore is the less liable of the two to cause injurious pressure on the location of the passage of the great sciatic nerve into the thigh. Either of these two saddles perfected as to its objectionable point would leave nothing to be desired from the standpoint of anatomical requirements and harmlessness. One of them is already so near the desideratum that but little improvement in the manner indicated would make it perfect.

2. The lack of devices to completely overcome vibration and incessant hammering of the perineum during use of the wheel. It goes without saying that the more imperfect and harmful from the standpoint of anatomy is the saddle, the more injurious this vibration and hammering of the perineum is bound to become in any given person. (It may be remarked, in passing, also that the injury should be more marked the more the position of the body is habitually inclined forward.) It is true that the pneumatic tire reduces to some extent this vibration and hammering when the wheel is driven upon any but a perfectly smooth and regular road ; and true also that the springs of some saddles may accomplish a further reduction. But in the stiff-framed wheel it is nevertheless still present, although the rider may have habituated himself to be unconscious of its disturbing presence. One need not be a physician to understand the ultimate effects of this repeated and prolonged thumping of the perineum and vibration of the cerebro-spinal nervous system. It is not necessary to discuss this matter much in detail. Every practising physician has

doubtless already witnessed repeatedly the evil effects of the bicycle upon his male patients who for any reason have had a troublesome prostate, a sensitive urethra, or an irritable bladder, and has been obliged to advise them to desist. The wheel manufacturers and the male riders of the bicycle, young and old, should not only be made to understand the sure injury of such persons as those above mentioned which is bound to follow the repeated or prolonged use of a stiff-framed wheel having a saddle which hammers upon the prostate or urethra, and constantly shakes considerably the cerebrospinal nervous system; they should also learn to appreciate the still more important fact that the use of such wheels for years strongly tends to convert a perfectly healthy prostate gland and urethra into sensitive and diseased organs. Physicians who have given this matter serious study cannot but look forward to a very large increase of persons in the next twenty or thirty years suffering with diseased prostate glands, the most of whom will have ridden in youth and early manhood vibrating stiff-framed wheels with malformed saddles and in bad positions. For the woman, this combination of vibrating wheels with harmful saddles must also prove injurious in the long run in very many instances, but for somewhat different reasons which it is unnecessary to particularize here.

In what we have above written we are by no means opposing the general use of the bicycle as a totally unsafe vehicle *per se.* We are simply emphasizing two serious faults in the present construction of the bicycle, perfect as it may be otherwise. These are very serious faults, indeed, but they can be remedied, and must be, if the full capabilities of this machine for pleasure, health, and comfort are to be attained, through the combined ingeniousness of the inventor and the enterprise and skill of the manufacturer.

The ideal wheel, with a perfect anatomical saddle which is at the same time comfortable to sit upon, and with the vibration and the hammering of the perineum reduced to the lowest possible minimum, should be hailed with acclaim by the general physician and the hygienist, for with such perfection in construction and adaptation to the wants of men and women who need exercise in the open air as well as exhilarating recreation, we can think of nothing at this time which would be a better means to such an end within the reach of millions of Americans.

We have spoken of two new saddles as the only ones which now closely approach the desideratum from the standpoint of anatomy. Within the year an attachment has been devised for the frame of the bicycle by use of which, theoretically and practically, the vibration and the hammering of the perineum appears to be effectively reduced to a minimum, if not removed entirely. With such a device and a perfect anatomical saddle combined, it seems that the ideal bicycle as a nearly perfect hygienic machine may be realized in the near future.

But even with these two great improvements near at hand, there is still one more point in the possible construction of the machine which we cannot but record as important to health in the long run which should lessen heart-strain. It is the adaptation of such a device as will necessitate the least possible muscular exertion in hill-climbing. In this, also, there seems to be promise of great improvement.

With the general introduction of each one of the above-named most important improvements in bicycles the objections of physicians and hygienists, except in special comparatively rare cases, will vanish. The manufacturer will be wise who most promptly and perfectly meets these hygienic demands.

EDUCATE THE MASSES IN THE SIMPLE PRINCIPLES OF PREVENTIVE MEDICINE.

We have reprinted in this issue an abstract from one of our exchanges in which, among other matters having an important bearing upon preventive medicine, it is pointed out how the infection of scarlet fever may be transmitted long distances by the post. In the particular instance related dense stupidity on the part of the sender and receiver of a letter, in which was placed some patches of desquamated epidermis of a child convalescent from scarlet fever, was the cause of the attack in the house of the receiver, separated many miles from the residence of the sender. The case cited affords unusually tangible evidence of how the public postal service may occasionally become the medium of distributing the seeds of infection, without the commission of any fault whatever by the government employees. The fault lies almost always at the starting-point of the postal matter, in fact at the domicil of the sender, and it springs either from gross ignorance of the nature and mode of spread of the particular infectious diseases, or from a callous indifference to the consequential injuries which may thereby be inflicted upon many. It is possible enough that the infection of diphtheria may be transmitted through the post quite as easily as that of scarlet fever. That the germs of small-pox, yellow fever, cholera, etc., are capable of a similar mode of transmission at times is quite generally admitted. What is the best remedy or public defence against such possibilities of wide diffusion of infection from individual centres thereof? We may reply that disinfection of the mail matter coming from each known infection centre would much reduce whatever risk there may be of receiving infection through the post. This has been sometimes attempted, chiefly however as an adjunct to the imposition of a general or local quarantine when urgency seems to have required it. But it is not readily applicable in ordinary times, and even if it were it cannot be regarded as promising a perfect remedy in the present status of general intelligence and what we may denominate as the social reciprocity of to-day. There are at the present time far too many people who are intensely ignorant of the nature and manner of diffusion of the specific infections and contagions, and too many also who having some knowledge of this kind are so heedless as not to think at all of the jeopardy in which their carelessness may place their neighbors. In the absence of alarming epidemics, and in the absence of a perfect machinery of enforced prompt notification of all infectious and contagious diseases, the postal authorities at present can do little to prevent the diffusion through the mails of infectious matter from households where the existence of disease is not known to the authorities, and where dense ignorance or utter callousness towards the public prevails. It seems that a campaign of public education as to the nature and means of preventing infectious diseases may be after all the best possible defence against such and similar dangers to the public health.

It is not only the parents and other relatives of children who need to be reached through a campaign of education concerning the nature and best means of preventing the spread of infectious and contagious diseases, but the diffusion of knowledge on this subject should be as universal as possible—it should reach especially all those who have the care of children. The following actual occurrence will illustrate how important it is that children's nurses especially should know what diseases are infectious or contagious and how to avoid them. A cultivated and affluent family, having a number of children, in order to escape the danger of diphtheria, then epidemic in the city, located in the country in a salubrious and isolated spot, where the children might have the benefit of plenty of sunlight, open-air exercise, fresh pure milk, etc. A child's nurse in this prudent family during a day and night off visited and remained all night with a friend in a house at a distance wherein there was at that time a case of diphtheria. A few days after the return of this nurse to her charge, the child in her care developed an attack of diphtheria, the origin of which remained a mystery to the intelligent parents and experienced family doctor until after recovery, when this visit of the nurse at a diphtheria house was incidentally discovered. The nurse attempted to justify herself on the plea that she did not know that the disease was contagious. If she told the truth, she was only as densely ignorant in such matters as many another of her class.

Indeed, how many lives of little ones might be saved to loving parents, and to the ultimate benefit of the State, were it as much the fashion of the day to require of the child's nurse a fit preliminary training—including as one essential a fundamental knowledge of what are the infectious and contagious diseases, their mode of spread and the means of preventing them—as it is now to demand trained efficiency on the part of nurses for the sick.

Another class of people who, next to the parents and the children's nurses, need to be well instructed in the subjects above mentioned are the heads and assistants of kindergarten schools. In fact these people as well as those holding a similar relation to the higher schools occupy a most peculiar and responsible position, intimately related to the home of the individual pupil and to the whole community. They should not only possess sufficient knowledge of physiology, hygiene, and preventive medicine to teach their rudimentary principles clearly and effectively, but they should also be able to put them into instant and effective application upon occasion.

Statistics inform us that more than forty per cent. of all the deaths is caused by infectious diseases which are preventable. When the masses of the people shall learn and appreciate the full significance of this fact, its appalling truth will then be a thing of the past, for the populace and their servants, whether public or private, will then vigorously apply the sure means of prevention.

Till then let us prosecute, with all earnestness and pertinacity, through the schools and all other means accessible, a campaign of popular instruction in the simple fundamental principles of hygiene and preventive medicine.

COMMON SORE THROATS.

In the *Lancet* for February 15 Dr. Clement Dukes, physician to the Rugby School, alludes to the importance of seeing invalids in the very earliest stage of their indisposition, as we are able then not only to learn the symptoms of the onset of the disease, but, a circumstance of still greater moment to the individual patient, to place him early under the most favorable conditions as regards himself, and to isolate him if need be for the protection of others. In his very early days of office at the school, he says, he recognized the importance of knowing the condition of the throat in the young, it being involved in so many illnesses; consequently the habit arose intuitively of looking at the throat of every boy who expressed himself as not feeling well, without waiting for any complaint from him concerning it. Whenever the least deviation from a healthy appearance was noticed, says the author, however trivial, strict isolation was enforced, and the patient was kept away from the healthy boys until he had quite recovered. In this way all ailments attended with sore throat, some of them of the greatest moment to the young, had been prevented from spreading. It is scarcely necessary to point out, he says, that it is the first cases that require attention and isolation if the diseases are to be limited in extent. On inspection of the throat in the young in the very earliest stage of its abnormity certain common conditions are discovered which gradually assume the various forms typical of recognized diseases, and these throats, says Dr. Dukes, are seen and the patient isolated often long before a diagnosis is possible. When a case can be diagnosticated at first sight, it is far too late for the welfare of the individual and for the protection of others.

With regard to inflammatory sore throats, he says, the first stage of all the common sore throats, which are termed amygdalitis, is that the membrane of the fauces generally appears smooth, dry, glistening, and as if all secretion and the superficial layer of the mucous membrane had been scraped off and the surface polished. Many throats under treatment proceed no further than this stage. In the next condition the superficial layer of the mucous membrane is swollen, which causes it to assume a dusky-red velvet appearance, and this also may proceed no further. This is succeeded in a large proportion of cases by swelling of the tonsils, which gradually become covered with minute isolated white dots, which are occasioned by an excess of the normal secretion, owing to the inflammation, from the follicles of the tonsils. This secretion in certain cases — and these individuals usually have this kind of throat whenever they take cold—becomes so excessive as not only to appear at the orifices of the follicles, but to join one another until the surface of the tonsil becomes covered with a thick, soft, ashy-gray, dirty-looking membrane, but one which bears no more relation to diphtheria than chicken-pox does to small-pox. The same individual invariably has the same kind of inflammatory throat, and whenever he takes cold it is in the form of, or accompanied by, a sore throat. In the last phase of these cases of amygdalitis the inflammation and swelling—often after a prior subsidence, so as to seem almost like a recrudescence—increase, extend, and involve the soft palate, and a quinsy is formed. All these forms of amygdalitis, says the author, are infectious in the young, and they spread in the same way, but not to the same extent, as common colds.

Respecting septic sore throats, he says, which may arise from defective arrangements in the water-supply, drainage, etc., he urges the necessity of flushing drains and emptying drinking-water cisterns and filters before the reassembling of school after each vacation.

The sore throat of scarlet fever in its initial stage consists of a diffuse, dull, brick-red appearance of the mucous membrane of the fauces—in fact, it is a diffuse rash on the mucous membrane similar to that which occurs subsequently on the skin. It begins at, or at all events is most visible on, the wings of the soft palate, extending to the tip of the uvula, but it involves the whole of the mucous membrane of the fauces. In a large proportion of cases it begins and ends in this, though in many it progresses to every phase of ulceration, which alone is sometimes difficult to assign to scarlet fever; but the character of the rash, together with the peeling tongue on the fourth day, leave little doubt as to the diagnosis. It is the slight sore throat accompanied by merely a transient rash which causes the main difficulty in diagnosis.

In the *sore throat of diphtheria*, at the onset, there is usually a dark redness and swelling of the tonsils and the fauces generally, with very marked œdema of the uvula, which appearances are quite undistinguishable from acute amygdalitis. Hence, says Dr. Dukes, the necessity of at once isolating all patients with amygdalitis, as no one can possibly be sure what form of sore throat it will prove to be. Subsequently the whole or a part of the fauces becomes covered with a grayish secretion, sometimes assuming the character of a dense membrane like wet wash-leather, which arises in patches, and rarely in the small white regular dots which coalesce into a patch incidental to amygdalitis. These patches spread and may become continuous, involving the whole of the fauces.

The sore throat of varicella is occasioned by spots on the mouth and pharynx similar to those on the skin, and they often greatly resemble the small ulcers common to stomatitis, from which they are distinguishable by the eruption on the skin.

The *sore throat of epidemic roseola* (*Rötheln*) resembles closely the early stage of the throat of scarlet fever, but it is accompanied by very early enlargement of the posterior cervical and other glands. There is no peeling of the tongue on the fourth day.—*N. Y. Med. Jour.*

THE RECENT EPIDEMIC OF DIPHTHERIA IN CHICAGO.—RESULTS OF THE SERUM - ANTITOXIN TREATMENT.

Dr. E. P. Murdock, Medical Inspector of this city, recently submitted a preliminary report of the work of the auxiliary medical corps of the City Health Department, the period of whose appointment terminated on the 21st of January. In his report Dr.

Murdock says: "When, in the latter part of September, 1895, the daily reports of diphtheria gave indication that we were threatened with an epidemic of the gravest character in the history of the city, the assistant commissioner, Dr. F. W. Reilly, requested me to give my attention to the situation and respond to the call of physicians for the administration of antitoxin, and such other duties as in my judgment would assist in staying the ravages of the disease. Accordingly I began my work by responding to the call of physicians for the administration of antitoxin, the verifying of diagnosis by bacterial examinations, and the relief of laryngeal stenosis by intubation. In connection with this work I also investigated the causes which led to rapid spread of the contagion, gave directions for isolation, made notes of the environment, immunized children exposed, and co-operated with the attending physicians in all respects to restore patients suffering from diphtheria, and to protect the public from further exposure. Within twenty-five days I had treated ninety cases of diphtheria with only four deaths, immunized twenty-two children who had been exposed to diphtheria without a single case of contagion, and carefully noted the effect of treatment in all its phases, which led to the following conclusions, which were reported to the department:

1. "No evil or deleterious effects follow the administration of antitoxin which can be attributed to the use of the remedy either with diphtheria patients or with healthy children for protective purposes.

2. "No child treated for immunity has contracted the disease, no matter how much has been the exposure.

3. "All patients are benefited by the treatment when administered in time to accomplish any results with a reasonable hope of recovery.

4. "The administration of antitoxin does not in any way interfere with other treatment.

5. "Careful observations were made to determine the sources of infection and the agencies which led to the spread of contagion, and the following conclusions are submitted:

1. "Failure to isolate patients and prevent unlimited visiting and open communication with friendly neighbors, and even the public schools.

2. "Failure to destroy or properly disinfect clothing and other material which had been in contact with the patients, and the lack of proper fumigation and cleansing of premises.

3. "The public character of funerals to the extent of exposing the body of a child dead from diphtheria to public visitation of friends and neighbors, they not only viewing the body themselves, but permitting their children to come in immediate contact and even kiss the dead child's face; nor was this all, but the bodies of children who had died from malignant diphtheria have been taken into churches for public services, and their little playmates have acted as pall-bearers without the least effort to even cleanse or protect the mouth or nostrils of the corpse.

4. "The unsanitary condition of water-closets, especially in districts where old outside vaults are still in use without washouts or sewer connections.

5. "Failure to report the so-called 'mild cases' which were exposed to indiscriminate contact with their little friends, from which many a malignant case developed."

From these causes he had traced about eighty cases of diphtheria with twenty deaths, all of which might have been avoided by proper precautions. The character of the epidemic, the variety of sources for the spread of the contagion, and the increasing inquiries for the use of antitoxin caused the work to grow to such an extent, and the demand from members of the medical profession for further assistance became so great, and at the same time the increase in the spread of the disease became so marked, that Commissioner Kerr determined to apply for more assistance through the organization of an emergency staff, and in support of this request it was shown that from thirty-four to forty-three cases of diphtheria were being reported daily, with a rapidly increasing number of deaths, and the necessity was urged of an organized systematic effort to control the ravages of this disease which was destroying more lives in a single year than had been lost from small-pox in a decade. A special appropriation having been secured by the commissioner for this emergency, well-known physicians were appointed and organized into an auxiliary medical corps of the Chicago Health Department, for the control of diphtheria. The city was divided into districts, with an inspector placed in charge of each district, three being detailed to supervise funerals and prevent so far as possible the spread of contagion from this source. Their service began November 22, 1895. The inspectors were instructed to ascertain the facts about all cases of diphtheria in their respective districts, and to use all means in their power consistent with professional ethics and under authority of law, to conserve the true interest of the public for the control of this disease. They were further instructed that there was no desire on the part of the department to supplant or in any way interfere with the prerogatives of the family physician, but on the contrary they were strictly enjoined to communicate with the physician in charge, and if possible to meet him and co-operate with him in the work in hand so that all assistance which could be rendered to the family should be administered through the agency of its own physician, thus sustaining as far as possible the relations which should exist between a physician and his families. They were also instructed, wherever it was possible, to determine by bacterial examination the true character of the disease; to learn whether antitoxin had been used or not, and if so, on what day of the disease, and the results; and at all times, so far as it lay in their power, to subserve the interest of the family physician, while protecting the public health.

Incubators and culture boxes or tubes were furnished for bacterial examinations, and such other supplies as seemed absolutely necessary for the work. A system of rules was formulated for the isolation of patients and the care of sick-rooms which would justify the removal of diphtheria display cards by the inspector, when, in his judgment, all sources of the spread of contagion were absolutely shut off, and a communication was addressed to the medical profession and the public, setting forth these points and asking their cooperation.

From the detailed reports of the members of the corps, submitted from time to time, the appended summary of the work performed has been compiled. Comment upon these figures is deferred until cases now under treatment are reported on. The summary embraces all cases disposed of up to and including January 10.

For the present Dr. Murdock contents himself with saying that he is entirely satisfied with the result; that the members of the auxiliary corps have reason to be gratified with the showing, and that the figures are commended to the attention of the medical profession as a contribution to the study of the antitoxin treatment and prevention of diphtheria, comparing favorably with the best results obtained elsewhere.

SUMMARY OF WORK OF ANTITOXIN CORPS OF HEALTH DEPARTMENT, NOVEMBER 22, 1895, TO JANUARY 10, 1896.

Total number cases diphtheria visited.		**1221**
At request of attending physicians....	**1169**	
Charity cases (no physician in attendance)........................	**52**	
	——	**1221**
Total number found convalescent on arrival..........................	**63**	
Total number found dead...........	**50**	
All other cases.......................	**1108**	
	——	
Total number found suffering from diphtheria........................		**1108**
Total number treated with antitoxin..	**1047**	
Total number in which antitoxin was not used.......................	**61**	
	——	**1108**
Total number recovered under antitoxin treatment..................	**961**	
Total number died under antitoxin treatment........................	**86**	
	——	**1047**

Death-rate under antitoxin treatment, 8.93 per cent.

Total number in which antitoxin was not used	61	
Total number of those known to have died	32	
Death-rate where antitoxin was not used, 52.46 per cent.		
Total cases treated with antitoxin		1047
Total cases proved (bacterially) true diphtheria	805	
Total cases diphtheria not bacterially proved	242	
		1047
Total cases bacterially proved		805
Total recovered	753	
Total died	52	
		805
Death-rate, 6.46 per cent.		
Total cases not bacterially proved		242
Total recovered	208	
Total died	34	
		242
Death-rate, 14.87 per cent.		

RESULTS OF ANTITOXIN TREATMENT IN 805 CASES OF TRUE DIPHTHERIA (BACTERIALLY VERIFIED).

Treated on	Total.	Recovered.	Died.	Death-rate. Per cent.
First day of disease	61	61	0	0.00
Second day of disease	187	184	3	1.60
Third day of disease	372	362	10	2.68
Fourth day of disease	109	92	17	15.60
Later than fourth day	76	54	22	28.94
	805	753	52	6.46

Total number of children and others exposed to the disease and treated with the protective dose of antitoxin	810
Total number of these who subsequently contracted diphtheria	4

—*Med. News.*

OFFENSIVE TRADES.*

By far the best treatise upon the subject of trade nuisances yet published was that of Dr. Ballard in the Report of the Local Government Board of England.

In a recent review † of the same subject, Dr. A. Bostock Hill presents the following general statement which is worthy of careful examination, since the increasing density of population in New England and the introduction of new manufacturing processes give frequent opportunity for the intervention of local health authorities in this direction.

"The number of possible trade nuisances is so great that I should hardly have time to mention them all by name in a single lecture. . . . Their classification is difficult, owing, in many instances, to their complex nature, but one has been effected by Dr. Ballard, which has at least the merit of being convenient. It is as follows:

"1. The keeping of animals.

"2. The slaughtering of animals.

"3. Other branches of industry in which animal matters, or substances of animal origin, are principally dealt with.

"4. Those in which matters of vegetable origin are dealt with.

"5. Those in which matters of mineral origin are dealt with.

"6. Those in which mixed matters—animal, mineral, and vegetable—are dealt with.

"One question of general interest applies to all of them: How far can such nuisances be considered injurious to health? This is a question far more complex than it appears on the surface, because of the difficulty of eliminating from the inquiry the influence of other circumstances—some known, some unknown.

"In certain trade processes emanations of an absolutely poisonous nature are given off, and the effects are clearly shown on those exposed to the poisonous fumes; for example, arsenic, or irritating gases like hydrochloric acid or carbonic acid. This, of course, applies chiefly to the workers, but in a less degree to those who live in the neighborhood of works where such substances are used.

"The general effects produced upon those in the neighborhood of works where ordinary effluvia arise may be said to be nausea, perhaps vomiting, loss of appetite, headache, giddiness, a general depression or weakness, and malaria; and that such conditions are produced in some we have abundant proof. It must be remembered that the question of interest or otherwise in the works has a very important bearing on the subject; for while undoubted suffering is caused to those who look upon the works as an annoyance, and have no interest in them, the manufacturers themselves often point to the fact that their work-people, who are most intimately associated with the effluvia, are not in any way inconvenienced.

---

* By S. W. Abbott, M.D., in *Bost. Med. and Surg. Jour.*

† Lecture before the Sanitary Institute of Great Britain, October 18, 1895, *Journal of the Sanitary Institute*, vol. xvi., part 4, p. 429.

"In Dr. Ballard's admirable report, he shows first that in all good faith employers are apt to forget those cases in which men have left their employ when suffering from ill-health, and have either gone to other occupations or to their clubs as chronic invalids. Again, in many instances such precautions are taken that the effluvia arising are far more noticeable at a distance than they are in the works themselves. There is, therefore, but little doubt that trade nuisances are in many instances sources of ill-health to many otherwise healthy people exposed to their influence; much more, then, must they be injurious to weakly people and invalids, who are more easily affected by conditions tending to lower the standard of health. That such is the case is found to be the result of some years' experience, and we may assume, therefore, that as the result of theory and practice, any causes which tend to make impure, even in a small degree, the air we breathe are potent means for lowering the vitality which it is the aim of sanitary science to maintain.

"One more point in connection with this subject demands a moment's attention, namely, the allegation sometimes made, that some effluvia arising from works are disinfecting in their character, and therefore a blessing in disguise. I have heard this statement made in all seriousness in the high courts, in relation to a nuisance arising from the making of charcoal. If, however, we consider for a moment that for these agents to be of any use as disinfectants they must be present in sufficient quantity to exert a deadly influence on the contagia, we see that the infinitesimal quantities diffused in the atmosphere can have no effects as disinfectants or germicides, but can only irritate and damage the health of the higher living organisms exposed to them."

In summing up the methods of preventing nuisance from offensive trades, Dr. Hill groups them as follows:

1. *Solid* offensive refuse must be separated from liquid, the solid portions being removed in close, impervious vessels.

2. *Liquid* refuse must be conducted away by proper drains, deodorants being used.

3. *Vapors and Effluvia* should be treated by a combination of the following methods (the particular combination depending on the trade): (*a*) Condensation by cold. (*b*) Absorption by water or chemicals. (*c*) Destructive distillation by heat in a closed vessel. (*d*) Combustion of all gases that can be burned. (*e*) Discharge of gases into the air at a great height.

LEAD-POISONING AMONG PAINTERS AND VARNISHERS, AND THE MEASURES FOR ITS PREVENTION.

The existence of many sick-benefit societies among the workmen and artisans of Berlin furnishes valuable information in regard to the general subject of metal-poisoning. Dr. Stüler, in a recent paper,* says, with regard to painters and varnishers, that in Berlin there were at work as active members of these societies in

1885, Varnishers, 203, of whom there were taken sick 13 = 6.4%.

1886, Varnishers, 357, of whom there were taken sick 21 = 5.9%.

1885, Painters, 3191, of whom there were taken sick 197 = 6.6%.

1886, Painters, 3169, of whom there were taken sick 330 = 11.1 %.

1887, Painters, 3545, of whom there were taken sick 292 = 8.5 %.

1888, Painters, 3000, of whom there were taken sick 313 = 10.4%.

"Out of 14,000 painters and varnishers employed in Paris yearly, an average of 250 visited the hospital on account of lead-poisoning," says Gautier. If there are added to this 250 a proportionately higher number of cases of lead-poisoning which are treated at home, the morbidity even then seems small when compared with that of Berlin. As a good Frenchman, Gautier lays the blame on the greater uncleanliness of the German workmen.

---

* *Vierteljahresschrift für öff. Gesundheitspflege*, 27, 4, p. 661, 1895.

In summing up this paper and proposing measures for the prevention of lead-poisoning among this class of artisans, Dr. Stüler makes the following statement:

"In my opinion the students in the professional schools and colleges should receive short and easy lectures on this subject, together with printed instructions. In addition there should be printed in the bank-books used by these workmen in their sick benefit societies the following directions:

"The use of lead paints is full of danger to the careless and unclean workman. The danger may be easily avoided by observing the following rules:

"Old lead paint must not be scraped from walls and other objects until it has been softened with alkali. The scraping should be done while the walls are wet.

"The handles of tools used must be kept clean from any deposits.

"In dusty jobs, the nose and mouth should be protected with clean cloths. After finishing the work, the hands, hair, face, and nostrils should be washed. For this purpose, in addition to water, soap, and brushes, a watery solution of tartrate of ammonia should be provided, with which the mouth should be rinsed. This must be done before eating and drinking.

"Smoking must not be allowed in work-time.

"Work should be done in a suit designed for the purpose, and it should be put on before and taken off after work.

"The workmen should apply to a physician upon the appearance of even the slightest illness."

CONSUMPTION AMONG WORKMEN.*

In a monograph by Dr. Sommerfeld, of Berlin, the author treats quite fully of the causes, frequency, and prevention of consumption among workmen. Chief among the conditions which predispose workmen to tuberculosis, the writer places the different sorts of dust arising from industries in which various materials, both organic and inorganic, are treated. He mentions the well-known appearances found upon section of the lungs of coal-miners, stone-cutters, iron-workers, knife-grinders, tobacco-workers, and cotton and wool spinners and weavers. He also dwells upon the effect of insufficient and improper food among such workmen, and upon the influence of over-crowding and of poor ventilation in their living- and sleeping-rooms.

Added to these he places much emphasis upon the effect of excessive use of alcoholic drinks on the workmen, which produces harm, not only through the effects of alcohol on the organs of digestion and the central nervous system, but in equal measure also through the terrible passion which is inseparably connected with frequent resorting to the ale-house, and which robs the body after hours of work of its proper nourishment, and carries to the lungs the poisonous odors of tobacco-smoke, together with carbonic acid, exhalations of clothing, bodies, etc. The author considers the life-shortening effects of alcohol on workmen as so thoroughly settled as to need no further comment.

In treating of the frequency of consumption among workmen, Dr. Sommerfeld presents several tables. The following shows the mortality of such workmen from consumption as compared with the general mortality; the figures on the right show the deaths from consumption in each 1000 deaths from all causes, and the other column the deaths from consumption in each 1000 living:

Occupations not exposed to dust.	2.39	381.0
Occupations exposed to dust.....	5.42	480.0
Dust occupations:		
Metallic dust....................	5.83	470.6
Copper dust.................	5.31	520.5
Iron dust...................	5.55	403.7
Lead dust...................	7.79	501.0
Mineral dust..................	4.42	403.4
Organic dust..................	5.64	537.0
From leather and skins......	4.45	565.9
From wool and cotton.......	5.35	554.1
From wood and paper.......	5.96	507.5
From tobacco...............	8.47	598.4
Mean........	5.16	478.9
Mortality of the male population of Berlin over 15 years of age....................	4.93	332.3

In the following table the mortality from consumption of two classes of workmen (knife-grinders and iron-workers) at different ages is compared with that of the male population of the same ages in several German industrial towns:

---

* Die Schwindsucht der Arbeiter, ihre Ursachen, Häufigkeit, und Verhütung, Berlin, 1895.

Ages.	Deaths from consumption out of 1000 deaths from all causes at each age period.			Deaths from consumption out of each 1000 persons living at each age period.		
	Knife-grinders.	Iron-workers.	Total male pop.	Knife-grinders.	Iron-workers.	Total male pop.
Under 20.......	857	636	—	9.9	3.6	—
20–30.......	769	771	815	14.0	13.4	8.1
30–40.......	870	731	545	31.9	9.5	5.7
*40–50.......	917	694	560	50.2	21.5	9.1
Over 50........	500	393	322	67.3	31.6	13.3
Mean........	783	590	460*	23.8	13.5	9.0

* These figures for Berlin are fully 50 per cent. higher than those of Massachusetts for recent years.

The author presents a table containing the mortality in twenty different occupations from phthisis, in which the figures for nine years are given. The table is not very conclusive as to any material changes in this mortality, comparing the first half and the second half of the period.

Prevention.—In general he states that every precaution which promotes better hygienic conditions among workmen, such as the improvement of the methods of works, regulating the hours of labor, and improving the social condition of the workman, serves to lessen the mortality from consumption.

Children of workmen should not be employed in or taught such occupations as are attended with the evolution of sharp dusts, such as file-cutting, knife-grinding, and stone-cutting.

The air-space and ventilation of rooms is also a matter of great importance.

The author reaffirms the following conclusions of the Congress of 1890, so far as the hygiene of workmen is concerned:

1. Consumptive workmen should be required to take care of their sputa.

2. In places where consumptives are at work with healthy people, tubercle bacilli must be rendered harmless by a sufficient number of cuspidors which can be readily cleansed.

3. In consequence of the frequency of consumption among certain classes of workmen (steel, cotton, stone, and tobacco workers), the fact that infection is the primary cause, the inspired dust being only secondary, should give rise to renewed exertions for their protection.

The following rules may be adopted for workmen in such industries:

(*a*) Cuspidors in sufficient numbers—better, one for each workman.

(*b*) Workmen to be forbidden to expectorate except into cuspidors.

(*c*) Arrangements should be made by which sick workmen can find treatment outside the establishment.

(*d*) Simple instruction should be given to workmen, as to the part which expectoration plays in the spread of the disease. The danger to smokers, in the cigars made by consumptive workmen, is emphasized.

INVESTIGATIONS RESPECTING THE DISINFECTING POWER OF SOAP-SOLUTION.*

Dr. Max Jolles, in his earlier investigations, demonstrated the destructive effect of soap-solutions upon the cholera bacillus, and the same inquiries are here extended to the germs of typhoid fever and the bacillus coli communis, these being two of the most usual species which have to be dealt with in the treatment of soiled linen. In this case only one variety of soap was employed, in the place of the five kinds used in the previous tests, as it had been proved that all of these soaps differed but little in their action upon the germs. The soap made use of in these experiments yielded the following results upon analysis:

	Per cent.
Fatty acids......................	67.44
Total alkaloids..................	10.40
Free alkali......................	0.041

Ten sets of test-solutions were made up in sterilized distilled water, containing from one per cent. to ten per cent. of the above soap, and in each case 100 cubic centimetres of the solution were introduced into sterilized Erlenmeyer flasks. Each flask also received 20 cubic centimetres of freshly prepared meat-juice-peptone bouillon, duly impregnated with germs of typhoid fever and bacillus coli communis. After three days' cultivation at various temperatures test-plates were cast in the usual way and examined microscopically. The results obtained are set forth in tables. Four sets of ten tests each were undertaken with the typhoid fever cultures, and three sets each of ten different strengths with the bacillus coli communis.

---

* *Zeitschrift für Hygiene*, 1895, p. 130.

As the outcome of the experiments, the author observes that, in the case of the typhoid bacilli, the disinfecting properties of the soap-solution are much more marked at low temperatures (4° C. to 8° C.) than at ordinary temperatures. There is, practically, little difference in the disinfecting powers of the dissolved soap at any range of temperatures between 18° C. and 30° C. When rags infected with the germs were treated in the soap-solution the action of the soap was very marked, and even a one-per-cent. solution was injurious to the germs in fifteen minutes, and a six-per-cent. solution resulted in the entire destruction of all germs with an exposure of equal duration.

A three-per-cent. solution was fatal in one hour, and in a one-per-cent. solution no germs remained capable of development after two hours' immersion. The tests of the soap-solution with the bacillus coli communis were not quite so favorable to its disinfecting action as in the former case, but this would be readily understood because of the far greater powers of resistance which these bacilli are known to possess. At low temperature a two-per-cent solution was fatal in six hours. As the temperature rises, the action of the solution diminishes, but even in the case of these bacilli an eight-per-cent. solution destroyed all germs in thirty minutes, a six-per-cent. solution in one hour, and a three-per-cent. solution in six hours. The author concludes that, in consequence of its antiseptic action, soap furnishes a powerful and safe disinfecting agent for certain of the most prevalent disease germs.—*Bost. Med. and Surg. Jour.*

THE INFLUENCE OF SEA AIR ON AFFECTIONS OF THE NOSE, THE THROAT, AND THE EARS.

THE November-December number of the *Archives internationales de laryngologie, de rhinologie et d'otologie* publishes an article on this subject in which the writer, M. Lavrand, of Lille, gives the results of his experience in this direction.

Persons, he says, who suffer with chronic nasal affections, such as hypertrophy of the mucous membrane of the turbinals, acute and frequent attacks of coryza, ozæna, and suppuration of the sinuses, may be benefited by remaining at the seaside for a certain length of time. The mental rest, the open air, the sun, and the frequent exercise modify the progress of these diseases by their effects on the general health. General bathing is beneficial; but salt-water douches or sprays are of moderate value only in these affections, with the exception, however, of ozæna, in which affection this treatment has several times given good results. On the whole, says M. Lavrand, all nasal affections that are not acute may be favorably influenced by sea air. By very excitable persons and by those in whom the pituitary membrane is particularly sensitive the exhilarating and exciting effects of sea air are not well borne.

With regard to throat diseases, hypertrophy of the tonsils frequently appears in lymphatic subjects, and such persons are benefited by the sea air, which exercises a favorable influence on the organism and increases its vitality, in this way causing the reduction of the tonsils. If the hypertrophy is of long standing, however, the local condition will not be benefited, although the general health may be favorably influenced.

Nasopharyngeal, pharyngeal, and laryngeal catarrhs, says the author, may be divided into three classes: 1. Those which are provoked and aggravated by sharp air. In such cases the sea air is contraindicated, unless the patient gradually becomes accustomed to it. 2. Catarrhal atony induced by defective vital energy of the mucous membranes. In this class of affections sea air certainly exercises an ameliorating influence. 3. Catarrhs resulting from vocal or general overtaxing. Of persons thus affected, those who are nervous, arthritic, or predisposed to indigestion should avoid the seaside; the others are marvellously benefited by the air, the sun, the bathing, and the exercise, provided the latter are taken gradually and in moderation. Acute affections of the throat are distinct contraindications.

With regard to diseases of the ears, says M. Lavrand, acute diseases are also a contraindication to this mode of treatment, and chronic affections of the ear are not usually influenced favorably by sea air; generally it aggravates the trouble. Diseases that are engendered or aggravated by a bad general condition, on which sea air exerts beneficial results, may be excepted.

M. Lavrand's conclusions are that a residence at the seaside for a certain length of time may be beneficial in the chronic affections of the nose, the throat, and the ear. The following exceptions, however, may be made: 1. If there is constant or intermittent suppuration of the ears. 2. If there is sclerotic otitis with buzzing of the ears. 3. Diseases of the pharynx and of the larynx in persons subject to congestion, in excitable tuberculous persons, and in arthritics who are predisposed to congestion or to acute or subacute attacks of inflammation of the mucous membrane.—*N. Y. Med. Jour.*

THE POLLUTION AND CLEANSING OF RIVERS, IN ACCORDANCE WITH EXPERIMENTS ON THE WATER OF THE OKER.

DRS. R. BLASIUS and H. Beckerts have made an interesting report on this subject. It has always been one of the strictest requirements of hygiene that public water-courses should be kept free from contact with domestic and industrial waste-waters, and this is all the more important in the case of towns which derive their water-supply from rivers passing through them. The city of Brunswick makes use of the water of the Oker for its supplies for drinking and other purposes, in accordance with the scheme adopted by the municipal authorities about the year 1862, at which time a chemical investigation was undertaken of the water above the town, which was declared to be suitable for this purpose, after treatment by subsidence and sand-filtration. At that date there were but few industrial establishments which drained into the Oker located above the town, and Wolfenbüttel, situated about ten miles above Brunswick, was almost entirely a midden town, and therefore scarcely any of its sewage entered the river.

The Brunswick water-works, comprising settling-pond and filter-basin, were opened in 1865, and they have since that date been from time to time extended in accordance with the growing needs of the town. In the period which has since elapsed, the conditions with respect to the districts above the town have been considerably changed; a series of beet-sugar manufactories have been erected, which discharge their waste liquors, more or less impure, into the Oker; and in the town of Wolfenbüttel many houses provided with water-closets now convey their drainage direct into the river. Notwithstanding all this, the water-works have hitherto been able to furnish a suitable supply of filtered river-water. Shortly after 1880 complaints were received during the winter months of the quality of the water, and from the year 1887 onwards the authors have carried out a series of weekly analyses, both chemical and bacteriological, of the service-water. During the severe winter of 1887–88, and again in the following winter, the number of germs per cubic centimetre present in the service-water rose rapidly from below 30 to 8505; the water had a bad taste and occasioned violent complaints. In subsequent years, during and after the active period of the sugar factories (the months of November and December), the same state of things occurred, and legal steps were taken to compel the offenders to abate the nuisance. In consequence of this action the authors were commissioned to report upon the pollution of the River Oker throughout its entire flow, and these observations have been conducted continuously since August, 1890. A description is given of the whole course of the river, which rises in the Hartz Mountains and flows into the Aller, a tributary of the Weser. The volume of water passing Brunswick varied somewhat widely from a monthly maximum of 85,500,000 cubic metres in April, 1891, to 2,500,000 cubic metres in July, 1893. Its quality is likewise very variable, as are also its contents in bacteria. The results of the different analyses are set forth in tables, and also the composition of the effluent from the beet-sugar works, which constitutes the most important source of pollution. There are likewise numerous tables to indicate the self-cleansing effect of the flow of the river under various conditions above and below Brunswick. As it was proved that the waste from the sugar factories was the chief cause of the foul state of the Oker, it was made compulsory, after 1891, upon all owners of works situated in the territory of the State of Brunswick to clarify these foul liquors by irrigation, and the marked improvement effected by these means is shown by analyses of the river-water before and after this remedial process was generally adopted. In a tabulated form a comparison is also made between the river-water and the filtered service-water at stated intervals throughout the years 1890, '91, '92, '93, and '94. The conclusions formed by the authors are summarized as follows:

1. The pollution of rivers is chiefly caused by domestic fouled water and the waste from factories.

2. The self-purifying powers of rivers depend upon (*a*) the extent of the dilution to which the polluting matters are subjected, (*b*) the access of atmospheric air, (*c*) the temperature, and (*d*) the exposure to sunlight and daylight.

3. The domestic waste-water and that from industrial establishments, in so far as they contain organic substances liable to putrefy (especially in the case of sugar manufactories), can best be purified by irrigation.

4. Gravel- and sand-filters are best adapted to purify upon a large scale river-water polluted by excreta and manufacturing waste liquors, and to convert the same into wholesome drinking- and service-water.

LEAD-POISONING BY PUBLIC WATER-SUPPLIES.

Much trouble has been occasioned in several districts in England in the past five years or more, notably in Yorkshire, from the use of drinking-water conveyed by lead pipes. A very interesting and valuable discussion on this subject occurred at a meeting of the medical health officers of Yorkshire in December, 1894.

Dr. Whitelegge stated that the waters which exercised plumbo-solvent action were mainly those which came from peat districts. He advocated an obligatory experimental inquiry as to the action of the water on lead in connection with every new water scheme where the source was in a moorland district, this point being scarcely less important than those which related to purity, sufficiency, and cost.

One after another, the great water corporations who supplied plumbo-solvent water had found themselves compelled to adopt preventive measures by way of filtration and chemical treatment, but not until much mischief had been done. Either chemical treatment or filtration involved considerable cost, especially with the more acid waters, and it could not be assured that entire success would be obtained.

Dr. Hunter referred to the subtle character of lead poison, and to the fact that lead-poisoning may have a strong hold upon a district and be doing irreparable damage unsuspected for some time by the local medical men.

Dr. Hunter presents the following list of ailments found in persons exposed to the influence of drinking-water containing lead, and shows that this form of poison affects nearly every organ in the body:

1. A state of physical and mental depres-

sion, well described as a state of listless languor, a condition of body and mind where everything seems a trouble, where life seems oppressed by an unaccountable burden, and where the only thing to do is to sit down in a state of misery and let things take their course.

2. Anæmia, with its attendant evils. This, says Dr. Oliver, is the one physical sign above all others which indicates that the system is becoming impregnated with lead.

3. Blue line on the gums. This is present in a number of cases that show no other sign, and on the other hand may be absent in severe cases.

4. Colic. A common and early symptom.

5. Digestive troubles, for example, pain, vomiting, nausea, constipation, or diarrhœa.

6. Various irregularities of the functions of the reproductive organs of women, and frequently abortion to an extent sufficient to affect the birth-rate.

7. An injurious effect on the male reproductive organs.

8. As a consequence of these, the deaths of newly-born children.

9. A whole train of severe nervous diseases: for example, (*a*) ill-defined pains and cramp-like sensations in the limbs and pains in the joints; (*b*) weakness and wasting of the muscles, leading to paralysis.

10. Blindness.

11. Diseases of the liver.

12. Diseases of the kidneys, which often are chronic and cause death after a lingering period of misery and suffering years after the original cause is forgotten; and following on from these the heart and blood-vessels are affected.

13. Gout, according to some, is freqnently caused by lead-poisoning; others say that it is only a coincidence, and not the result of plumbism. Dr. Hunter agrees with the latter.

In regard to the limit of safety, Dr. Whitelegge states that no water should be used for drinking which contains more than one part per million, and *any trace, however minute*, indicates danger.[*]

An epidemic of lead-poisoning has recently occurred in a small Massachusetts town of scarcely 1500 inhabitants furnished with a public water-supply, where twenty-five persons exhibited well-marked symptoms of lead-poisoning in varying degrees. These cases mostly occurred during the past summer (1895), add in each instance, or in nearly all, it was found that the water which stood in the lead pipes all night had not been carefully withdrawn and rejected. Lead pipes were used in this town everywhere for connecting the houses with the street mains, and in some cases these pipes were several hundred feet in length. The symptoms observed embraced nearly all of those which are named in the foregoing summary by Dr. Hunter. The amount of lead found in the water in several instances was as high as one-half grain per gallon, and lead was found in the urine of patients where examinations for it were conducted.

PRESERVATION OF INFANT LIFE.

Couveuses (brooders or incubators) for preserving the lives of feeble infants and those which are prematurely born.

Dr. Ciaudo,[*] of Nice, reports the results of the use of couveuses at the Maternité Lion at Nice, for a period of a little more than three years (October 29, 1891, to December 6, 1894). The number of infants treated was 185 and their weights varied from .8 to 2.9 kg. (1¾ to 6⅛ lbs.). Of this number 133 were living and doing well at the end of the period, 48 died, and 4 were under treatment.

Dr. Ciaudo groups them as follows:

1. All infants of less than 1 kg. (2⅕ lbs.) died, 8 in number.

2. Out of 32 infants from 1 to 1½ kg. (2⅕ to 3⅛ lbs.) 18 lived.

3. Out of 72 infants weighing from 1½ to 2 kg. (3⅓ to 4½ lbs.) 52 lived.

4. Out of 54 infants weighing from 2 to 2½ kg. (4½ to 5½ lbs.) 49, or 90 per cent. lived.

5. Of those weighing more than 2½ kg., 14 in number, all survived.

Dr. Vallin, in commenting on these figures, recommends the establishment of crêches, using this apparatus in all large cities. The heat is supplied by water warmed by a lamp and regulated by a thermostat to a temperature of 98 to 99° F.

---

[*] *Public Health*, London, 1895.

[*] *Revue d'Hygiène*, December, 1895, p. 1117.

Crèches.—Closely allied to the foregoing subject is that of crêches, and an important contribution may be found in the *Revue d'Hygiène* for November, 1895, by Inspector-General Dr. Napias. The writer makes the following suggestions:

That crêches should present in their construction at least as good hygienic conditions as should be required for every human habitation.

That, so far as infection is concerned, it should be made certain that the infant brings nothing whatever to the crêche, and that he carries no infection home to his family, and to this end the disinfection of the clothing which the infant wears at entrance and of that which he wears home should be accomplished as thoroughly as possible.

That daily baths should be required.

That the furniture and bedding should be of such material as will not readily admit of infection, and there should be separate toilet articles for each infant.

The bottles containing the sterilized milk should not admit of infection.

The attendants should have the necessary training, acquired by study and properly certified.

Dr. Napias states that these excellent institutions now number 58 in Paris and 29 in the suburbs of the Department of the Seine. The number of other cities and towns in France where crêches now exist is 147.

He gives general plans and descriptions of some of the best of these establishments.

TRANSMISSION OF SCARLET FEVER BY MAIL.

A case is related by Dr. Grasset* in which a child two years old was taken ill with scarlet fever in an isolated house one and one-half miles from the city and one-quarter of a mile from any other dwelling. Scarlet fever had been unknown in the district for many years. A sister of the child, aged nine years, had been visiting her grandparents for about six months, at a distance of twenty-five miles from home. This child was taken ill with scarlet fever. The parents did not visit her, but received by mail a letter, in which, in order to show the extent of desquamation, the relatives enclosed three scraps of epidermis, of several centimetres in diameter. The parents allowed the infant to take this letter in her hands. It was received on the 21st of November. On December 1 the child was taken ill with fever, followed by vomiting, sore throat, and a general eruption.

A similar case is published by Sanné in the article on scarlet fever in Dechambre's "Dictionnaire Encyclopédique," p. 327. A sick person wrote from Germany that he was "peeling" so abundantly that he was obliged to shake the letter frequently, which he was writing. A few days afterward this letter was received in Brittany, the mother and daughter were taken ill with scarlet fever; the mother died, while the daughter recovered after a serious illness.—*British Med. and Surg. Jour.*

THE REMEDIAL ACTION OF ERYSIPELAS IN SYPHILIS.

A NUMBER of observers have noted the speedy subsidence of syphilitic manifestations under the influence of an attack of erysipelas, but thus far very little has been recorded tending to support the belief that syphilis is ever permanently cured by such an attack. In the *Centralblatt für innere Medicin* for February 1, Dr. Rudolph, of Magdeburg, reports two cases that illustrate the temporary subjugation of syphilis by an erysipelatous attack, but do not prove its absolute cure. In the first case, that of a man, fifty-two years old, the syphilis was of twenty-nine years' standing. The syphilitic manifestations observable at the time of his attack of erysipelas were two sores, one on the ala nasi and the other on the supra-orbital margin of the right side. On the ninth day of the erysipelas the sores had entirely healed. The patient was not seen after that, so it cannot be said that he continued free from syphilitic manifestations.

---

* *Annales d'Hygiène et de méd. légale*, August, 1895, p. 143.

The other case was that of a young woman who had had syphilis for four years, had undergone three courses of mercury, one by inunction and two by hypodermic injection, and had taken great quantities of potassium iodide. For all that, she was found to have several glands enlarged to the size of a pigeon's egg under the lower jaw on each side and posterior cervical glands varying in size from that of a pea to that of a hazelnut. She was very weak and emaciated, and, in consequence of rheumatic pains in the knees, accompanied by well-marked inflammatory thickening, could walk but little. This rheumatic trouble, she said, had been present ever since she had had syphilis, also exceedingly severe headache. There was paresis of the left half of the face, and occasionally there were spasms of that side of the face. In spite of her weakness, she was given another course of mercurial inunctions, a drachm of mercurial ointment being used daily for thirty days. The effect was nil, and she declined to submit to further treatment.

In about a year Dr. Rudolph was called to attend her again. She was then extremely cachectic, she had been bed-ridden most of the time on account of great debility and pains in the knees, and her headaches had never left her. Moreover, her former manifestations of syphilis were still present. She was now in the early stage of what proved to be a severe attack of erysipelas, which spread from the face over the entire head. In ten days the fever and the exanthem had entirely disappeared; not only that, but she was apparently cured of her syphilis. The clusters of submaxillary glands that had threatened to suppurate melted away entirely as the inflammation disappeared; there was no more headache or articular pain; the facial paresis and spasms gradually ceased, and her general health was so rapidly restored that in the course of a month she was able to return to work as a tailoress. A relapse occurred, however, at the end of a year.

The author cites somewhat similar cases observed by various writers, together with one recorded by Petrowski in which the patient, who remained under observation for several years, seems to have been really cured. He was a powerfully built soldier, twenty-three years old, who was found while suffering with facial erysipelas to have a superficial sore on the penis, swelling of the inguinal and cervical glands, erythematous redness of the pharynx, and broad condylomata on the soft palate and on the pharyngeal wall. The erysipelas lasted fourteen days, and the fever was severe. With its subsidence, and without any mercurial treatment having been employed, all the syphilitic manifestations disappeared, and none others ever made their appearance.—*N. Y. Med. Jour.*

THE TREATMENT OF PUERPERAL SEPTICÆMIA BY ANTISTREPTOCOCCOUS SERUM.

In an article on this subject, published in the *Lyon médical* for January 26, M. Vinay remarks that, in spite of the greatest care and the strictest antisepsis, many confinement cases are complicated with septic fever, although they may be cases of self-infection only, in which the fever develops during labor, before any intervention, or even before the rupture of the amniotic sac. It is justifiable then, says the author, to employ the various measures at our command in order to diminish the mortality from a disease which still remains a menace to women.

The introduction of animal serum into therapeutics has led, says M. Vinay, to good results in the various affections which are caused by the streptococcus, and in the treatment of puerperal septicæmia favorable results may be expected from the new method.

The author gives the histories of four cases in which this treatment has been employed, with the following results:

In the first case the immediate and favorable influence of the serum was evident. The temperature fell rapidly, the fever disappeared on the third day after the first injection, and the amelioration of the general condition was coincident with the fall of temperature. Without doubt, says M. Vinay, recovery was not definitive at the time, for a purulent collection formed in the Fallopian tubes; but, he says, it may be concluded, in view of the dangerous symptoms, that the results would have been rapidly fatal without the administration of the serum.

In the second case there were present the majority of conditions that favor infection, which was produced during a labor that was disturbed by complications, which seemed to proceed from the vagina and from the cervix rather than from the body of the uterus. M. Vinay does not deny that the patient would probably have recovered without the administration of the serum, but it undoubtedly caused rapid apyrexia and consequent restoration to health.

In the third case, which terminated fatally, the treatment was not begun until three weeks after confinement, and the symptoms were then so grave as to preclude the idea of recovery. The lesions found at the autopsy showed that all the organs were degenerated; that it was a case of grave septicæmia without localization and without suppuration. Perhaps, says the author, if the treatment had been begun earlier the results would have been different, as it was a case which seemed particularly amenable to this mode of treatment.

In the fourth case the treatment was not directed against the septicæmia, but against one of its complications—puerperal insanity. No results followed the administration of the serum, and the psychosis rapidly became chronic.

The employment of antistreptococcous serum, says M. Vinay, does not apply to the general condition only; it aims to modify the infection of the blood when the economy is invaded at the time by the streptococcus or by its toxin. This method, however, he says, must not be exclusively employed in these cases, at least in the beginning. Local treatment of the infected mucous membranes and of vaginal ulcers, antiseptic injections, and especially curetting, are equally important. When the symptoms are recent the first indication is to suppress the original foci, and the general infection may be combated afterward.

This serum may not be efficacious in all forms of puerperal septicæmia, as the microbian agents which cause it are of many varieties. Besides the streptococcus, there are the staphylococcus, the *Bacillus coli*, the saphrophytes of putrefaction, and, exceptionally, the gonococcus. If the serum has no influence on the latter, bacterial researches should be made in order to ascertain the nature of the infection. The most serious infections are caused by the streptococcus, and when the symptoms begin with a chill, when the temperature is 104° F., and when the general condition is grave it may be concluded that the latter agent is the cause. The others usually show their presence by less marked symptoms. However, says M. Vinay, there is nothing absolute with regard to this, for attention has been called to fatal cases of infection caused by the *Bacillus coli;* but in a general way it may be affirmed that in all cases where the symptoms rapidly become marked the presence of the streptococcus is almost certain.

M. Vinay concludes from his researches that we possess in serum therapy an efficacious means of combating the several forms of puerperal septicæmia.—*N. Y. Med. Jour.*

SEWER GAS AS A CAUSE OF CHOREA.

By F. W. Jollye, M.R.C.S.,
MEDICAL OFFICER OF HEALTH TO THE ALRESFORD DISTRICT COUNCIL.

The following history of an outbreak of illness in a house may be of interest to those who have read Dr. Cheadle's paper on "Acute Rheumatism." The notes were taken several years ago when I was helping Mr. Wilcox, of Warminster, in whose practice the cases occurred.

On November 18, 1889, Mr. A. was attacked with facial erysipelas of a severe type. He had several attacks in other parts of his body and developed double pneumonia and endocarditis, and only recovered after a very severe illness with a damaged mitral valve and permanent regurgitation. On inspecting the drainage the following were the facts observed: The water-closet, which was situated on the landing close to the bedroom doors, was of an old type with large container and D-trap, and for several days the tank in the roof, which was supplied by rain-water only, had been empty owing to the dry weather; the flushing consequently had been done very imperfectly by hand, and on pulling up the plug foul gas escaped. The soil-pipe (a 4-inch one) was ventilated by a 2-inch pipe above and below was not disconnected from the drain, which discharged into a cesspool about fifteen yards away. The drain from the kitchen sink emptied into the same drain, and was also not disconnected.

On November 20 Mrs. A. (who had been confined with twins on August 30 previously and had no subsequent trouble) was attacked with erysipelas, and recovered after having an abscess opened in the arm and leg.

On December 12 Mr. A.'s father developed erysipelas of the face and scalp, and recovered after a severe illness, an abscess having formed in the cellular tissue of the eyebrow.

On December 25 a little girl, aged 4 years, had a slight attack of erysipelas in one eyelid. Several of the children during this time had had sore throat, and the following cases of chorea were amongst the number:

On January 25, 1890, we saw a little girl, aged 8 years, who for the last seven or eight weeks had been gradually getting anæmic and breathless; on examination the heart was dilated and there were symptoms of mitral obstruction and regurgitation. A few days afterwards we examined another sister who had similar symptoms, and she was found to have mitral regurgitation with œdema of the legs, and in April she developed chorea, which ran a fairly severe course in eight weeks, but she was left with a permanently damaged heart when examined in the October following. About the same time (February) another sister, aged 9 years, suffered from chorea, which ran a very similar course, with the exception of the absence of any heart trouble. Neither of these children had any signs of rheumatic fever. Unfortunately my notes make no mention of the family history as regards the prevalence of rheumatism.

I think there can be no doubt that the same poison was the cause of the illness both in the adults and children; and if we grant this we must also grant that this poison was not that of acute rheumatism.—*Brit. Med. Jour.*

INTERMENT AND CREMATION.

Nature gives the results of certain investigations of the soil in graveyards made by Dr. Lösener, which go far to dispel the idea in the minds of the laity that burial-grounds are sources of pestilence. The duration of the vitality of certain pathogenic bacteria was carefully observed, and it was found that the microbes of cholera lived for about 28 days, those of typhoid 96 days, those of tuberculosis about 100 days. The bacilli of tetanus were found to thrive for a long period, since they could be detected after 361 days. The germs of anthrax, it is not surprising to learn, survived over a year. As regards the spreading of these germs into the surrounding soil and into streams of water, only those of anthrax could be detected at much distance from the body from which they emanated. In regard to the other germs, none were detected beyond the immediate position of the body or carcass which contained them.

These experiments go to show that ground-burial cannot be considered a source for the spread of epidemics where the precautions insisted upon in all well-conducted cemeteries are enforced. In country districts such method of burial will unquestionably ever remain the favorite. In large cities, however, where land is dear and the population is constantly spreading in every direction, incineration will ultimately prevail over ground-burial. The opposition to cremation is, after all, simply one of sentiment. There is nothing in Holy Writ nor in the creed of any religious denomination which speaks against it. Those who have witnessed the slow decomposition of the human body will always prefer the wholesome and speedy combustion by fire, which simply reduces the body more quickly into the elements which even ground-burial cannot improve upon, the process being only slower. One thing, however, is lacking toward the popularization of incineration; and this is more certain methods of securing the desired result at less expense to the feelings of those who witness it. The descriptions given us by some who have been present at incinerations are little short of revolting. Certainly the retort should always have attained the proper temperature before the body is cast into it, and every precaution should be taken to avoid the odor of burnt flesh becoming evident. Such results, however, will surely come in time, as the operation is often enough called for to warrant the expenditure requisite for obtaining perfection in method.—*Am. Med.-Surg. Bul.*

THE NEED OF PUBLIC BATHS.

THE American-born citizen is, as a rule, fond of water, and therefore is cleanly in his habits. From force of example the foreign-born, who flock to our shores in search of the Eldorado which they lack at home and hear of as existing here, soon become equally clean. Probably, however, there exists no American city where the facilities offered for securing cleanliness of body are as ample as, we learn from an article in London *Outlook*, pertains in that city and, as a rule, in other cities of old England. True enough, spasmodic attempts have been made in the city of New York to establish public baths accessible in the winter months, as is the case to a degree in the summer; but nothing here can compare with the system in active operation in England. In London and in Liverpool (the latter city, by the way, having the reputation of being the dirtiest town of all England) there exist countless public bathing establishments, some of them free, but in the majority offering facilities for bathing at rates varying from a penny to 50 cents. In Liverpool there are seven public baths, and these were used last year by 450,000 people. In the smaller towns generally the public bath is regarded as a municipal institution. In one of the poorest parishes of London, with a population of 80,000, there were 47,000 who took advantage of these free bathing-places.

Since cleanliness is next to godliness in every sense of the expression, the municipal authorities, perhaps the boards of health of our cities, should interest themselves in this matter and provide public baths. The large proportion of the population in our cities have absolutely no facilities for bathing in the tenements they perforce inhabit, and it is not alone an act of mercy to give them such, but it is also requisite from the standpoint of sanitation. The Legislature of the State of New York last year approved of the work being done in this direction by the Tenement-House Committee of this city; but as yet there exists but one, or at the best two, public baths open to the populace. Much money is not requisite, since the buildings need not be of an elaborate type. The small fee which should be charged, except in the very poorest quarters, would go far toward the payment of the running expenses. —*Am. Med.-Surg. Bul.*

A NEW ENGLISH AMBULANCE; THE PNEUMATIC TIRE FOR AMBULANCES.

THE letter-writer from London to the *American Practitioner* thus writes of an improvement recently adopted for ambulance purposes in the city named:

"A new pattern of ambulance, called the 'Salvator,' is being adopted by many corps of the St. John's Ambulance Brigade. The most notable defects in most ambulances are the liability to downward position of the head of the patient, the screws, pins, and straps liable to be lost, the fitting together of various portions, and the many things to be done at the time of emergency. In the Salvator the stretcher is simply laid on a light iron carriage, and at once the two are securely locked together. The carriage is fitted along one side with a box containing splints of various sizes, and under the head end of the carriage there is a box containing bandages, scissors, tourniquet, and other appliances. Great attention has been given to the balancing of the litter, so that perfect horizontality shall be preserved."

The use of the pneumatic and rubber-rim tires are under trial upon certain wagons, just as in this country, where they are in use in a number of our cities. A guarantee of a year's wear can be had for wheels that sell for about $100 per pair.

RESULTS OF THE BACTERIOLOGICAL EXAMINATION OF 1000 CASES OF SUSPECTED DIPHTHERIA.

By R. T. Hewlett, M.D., M.R.C.P., and Harold Nolan.

[From the British Institute of Preventive Medicine.]

The following paper is an analysis of the records of the bacteriological examination of specimens from 1000 consecutive cases of suspected diphtheria, forwarded by medical officers of health and practitioners from all parts of the kingdom to this Institute for diagnosis. We shall endeavor to give a summary of the results obtained, and to draw attention to any points of special interest noted by us in the course of the work.

EXAMINATION OF THE CULTURES.

The result of the examination of specimens from 1000 cases of suspected diphtheria forwarded and treated in the manner detailed above is that in 587 cases the diphtheria bacillus was found, in 409 cases it was not found, and in 4 instances bacilli were observed, as to the identity of which with the Klebs-Loeffler bacillus or the distinction therefrom we were unable to satisfy ourselves. Thus 58.7 per cent. of the cases were true diphtheria. In 40.9 per cent., or about two-fifths, of the cases, the diphtheria bacillus was not found, and the majority of these were probably not diphtheria. A few may have been diphtheritic, though for some reason or other the bacilli were not found, but from a careful consideration of the cases we do not think that the error so introduced would amount to more than 2 or 3 per cent. Granting that the majority of cases sent up for examination were doubtful ones, it is still apparent what a large number of non-diphtheritic cases must have been returned as diphtheria in the period before the days of bacteriological examinations.

ANALYSIS OF RESULTS.

In 25 cases out of 1000 no growth appeared on the surface of the blood-serum.

In 600 cases notes have been kept as to the organisms present in the cultivations, and are set forth in the following table:

The following Organisms were present alone or associated with the B. Diphtheriæ.	Cases in which the Diphtheria Bacillus was present, alone or associated with other Organisms.	Cases in which the Diphtheria Bacillus was absent.
Bacillus diphtheriæ alone	216	Pseudo-Diphtheria 2
Streptococci	6	32
Micrococci	55	79
Bacilli	19	41
Torulæ	9	1
Sarcinæ	6	2
Streptococci and micrococci	2	23
Micrococci and bacilli	9	19
Streptococci and bacilli	1	5
Torulæ and bacilli	1	3
Sarcinæ and bacilli	0	3
Micrococci (including streptococci) and sarcinæ	6	8
Micrococci (including streptococci) and torulæ	4	14
Many forms present together	19	15
	353	247

These results are only approximate, as they are based on the more or less brief examination necessary to determine the presence or absence of the diphtheria bacillus, and no special pains were taken to observe all the organisms which might be present. It is noteworthy that the diphtheria bacillus was obtained practically in pure cultivation in no fewer than 216 out of the 353 cases in which it was found. In only 6 was it associated with the streptococcus alone, but too much stress must not be laid on this point, for in a number of instances the mode of transmission of the specimen was not favorable to the vitality of the streptococcus, and in others it was doubtless overlooked, or perhaps included among micrococci. All the forms of the diphtheria bacillus have been met with, but as we are alone concerned with the bacteriological examination we are unable to throw any further light on their clinical significance, or on the import of the so-called pseudo-bacillus.

CASES OF INTEREST.

Some cases examined present points of considerable interest.

The specimens were from cases of conjunctivitis; in one the diphtheria bacillus was found; in the other, which was associated with faucial diphtheria, only the streptococcus pyogenes.

In one instance specimens were taken from the fauces and from the vagina of the same case, and bacilli of the same type were found in each. In another, a pure culture of the diphtheria bacillus was obtained from a severe case, followed by paresis, in which the infection of the throat probably originated from a diphtheritic wound of the finger incurred during laboratory work.

In a case of diphtheritic paralysis, typical so-called pseudoforms were met with, and were non-virulent, and it is an interesting question whether these bear any, and if so what, relation to the diphtheria bacilli originally present.

PERSISTENCE OF THE BACILLI IN THE THROAT.

The 1000 cases on which our results are based are all primary examinations, but in several further examinations have been made to ascertain whether the diphtheria bacilli had disappeared, and the subjects were free from infection. From such "repeats" it would seem that the bacilli are commonly to be found in the throat two to three weeks after the attack, but that this period may be greatly exceeded. Thus in one instance the specific organism was found seven weeks, in another nine weeks, and in a third twenty-three weeks after convalescence. In the latter case, the virulence of the bacilli, as tested by inoculation, was maintained to the last, for a guinea-pig inoculated with 0.25 c.c. of a forty-eight hours' broth culture died in thirty-six hours.

Another notable case was one in which virulent Klebs-Loeffler bacilli were found in the throat of a school-boy, who, six months previously, had suffered from an illness which, from the occurrence of paresis, was evidently diphtheritic, though not diagnosed as such at the time; in all probability this case was the focus of infection from which originated a small outbreak of diphtheria among the class associates of the boy in question. These and many similar instances serve to illustrate the necessity for a bacteriological examination before a convalescent from diphtheria can be said to be free from infection.

FALLACIES IN THE BACTERIOLOGICAL METHOD OF DIAGNOSIS.

There are certain sources of error in the bacteriological method which, if excluded, would perhaps have increased the number of positive results by 2 or 3 per cent. For example, the swab may not be representative, that is, may have been taken from a small area which happened to have no bacilli upon it. In other cases, when the specimen is moist, the profuse growth of saprophytes may crowd out the diphtheria bacilli, and one advantage of a small wool swab over membrane is that it dries quickly, and the development of the saprophytes is thereby prevented. The use of local antiseptic treatment is another source of error, and in all cases the specimen should be obtained if possible before its commencement. The influence of such treatment is well illustrated by the following actual example: A specimen was received cultures from which revealed no diphtheria bacilli. It had been taken shortly after the use of sulphurous acid, and so convinced was the practitioner that he was dealing with a case of diphtheria, that he submitted another specimen from which a profuse and pure growth of the diphtheria bacillus was obtained. On the other hand a tonsil has been received which had evidently been energetically treated with perchloride of iron; and on another occasion some membrane which had been placed for a short time in a weak solution of Sanitas, and still smelling strongly of this preparation, and from both profuse cultures of the diphtheria bacillus were obtained.

CONCLUSION.

In conclusion, we would emphasize the desirability of a bacteriological examination in every case in which the throat symptoms are at all doubtful, for many of our cases which were not regarded clinically as diphtheria have proved to be so. Secondly, since virulent bacilli may be met with in the throat for weeks after convalescence, partial isolation at least should be insisted upon until repeated bacteriological examination has shown the absence of the infective agent.—*Brit. Med. Jour.*

IMMUNITY AGAINST TYPHOID AND COLI BACILLI.

Loeffler and Abel (*Centralbl. f. Bakt., Paras. u. Infekt.*, Bd. xix., 1896, p. 51) give the details of an investigation upon the specific properties of the protective substances in the blood of animals immunized to B. typhosus and coli communis. For those details we must refer the reader to the original paper; here we can only give their conclusions. They are as follows: (1) By treating dogs with increasing doses of virulent cultures of B. typhosus or B. coli substances appear in the blood of these animals which possess a specific protective property only against that kind of bacillus which has led to their formation. (2) The serum of normal animals protects against the fatal or lower multiples of the fatal dose of typhoid or coli communis. The strength of the dose supportable bears a certain ratio to the amount of previously injected serum. (3) The specific efficacy of the protecting substances in the blood of previously treated animals first becomes manifest if doses of the particular bacterium are given to the animal to be protected which are multiples of those doses against which normal serum confers immunity. (4) The specific protective action of the substances also shows itself on injection of a mixture of the bacteria and the serum. (5) Typhoid serum protects against a somewhat larger dose of B. coli than normal serum, and coli serum protects against a somewhat larger dose of typhoid bacilli than normal serum. By this somewhat increased protection the family resemblance of the two kinds of bacilli is manifested. (6) The specific sera do not protect against the substances contained within the bodies of dead bacilli to a greater extent than does normal serum. (7) By injection of normal serum into the abdominal cavity of guinea-pigs, and twenty-four hours later twice the fatal dose of dead bacilli, guinea-pigs may be immunized within two weeks against 100 times the fatal dose of living typhoid bacilli. (8) If less than the fatal dose of typhoid bacilli be given at the first injection, and afterwards increasing multiples of the fatal dose be given, guinea-pigs may be made within forty-eight hours to withstand 100 times the fatal dose (forced immunization). (9) By injection of 0.5 to 1 c.c. of a powerful typhoid serum animals which have been inoculated intraperitoneally with thrice the fatal dose of bacilli may be rendered immune to an infection that kills the control animal in twenty-four hours, even if the injection of the protecting serum have been delayed eight hours.—*Brit. Med. Jour.*

Department of Physical Education.

WITH SPECIAL REGARD TO THE SYMMETRICAL DEVELOPMENT OF THE BODY.

Edited by J. CLARK SLAY, M.D.

(NEW YORK.)

PHYSIOLOGICAL MEDICATION.

PHYSIOLOGICAL medication has made continuous and rapid progress during the past quarter of a century. The practice is founded on scientific principles, and its growth is commensurate with the growth of science.

No physician of the present day can be considered qualified to practice medicine unless he is well read in nutrition, hygiene, and physical education. Without a correct knowledge of these subjects, his armamentarium is in no sense of the word complete. The knowledge of foods, their chemical compositions, nutritive values, and correct preparation both for the sick and the well is absolutely essential for his meritorious success. Sir Henry Thompson very justly says: "No man is a really accomplished physician or surgeon who has not made dietetic principles and practice an important part of his professional education."

The knowledge of hygiene has enabled physicians to accomplish more, perhaps, for the health of human beings during the past decade than all other forms of medication combined. This knowledge has been the means already of numbering some of our once most dreaded diseases with the things of the past, and it is no insane prophecy to predict that it will enable physicians in time to wipe from the face of the civilized world all forms of contagious disease.

Physical education is also making a splendid showing, and the good that will result from its practice when more generally understood can scarcely now be realized. It is only within the last few years that physical education has been scientifically taught. Previous to this, physical training was conducted mainly by men having but little or no scientific attainments, and generally for other purposes than the healthy development of the body. There is still a great deal of over-training or physical straining practised, but, happily, this is fast giving place to systematic exercise for the symmetrical development of the body as a whole, with the view to both mental and physical culture.

Accomplished physicians realize the importance the knowledge of nutrition, hygiene, and physical education affords in the prevention and cure of disease. One of the oldest medical publishers in the country was asked some weeks since to look over the subscription list of the GAZETTE. After doing so he remarked: "This is the most select list of physicians that I have ever seen." We were, of course, prepared to hear him make this statement, for it is only this class of physicians who are at all well educated in the subjects it treats. The physician whose highest aim is to know how much quinine is required to stop the recurrence of chills, or mercury to stay the course of syphilis, has but little interest in nutrition, hygiene, and physical education, and we might add that his patients should have the same interest in him.

BICYCLE-RIDING UPON IMPROPERLY FITTING SADDLES

AS AN ETIOLOGICAL FACTOR IN PROSTATITIS AND STRICTURE OF THE URETHRA.

By WILLIAM WARREN TOWNSEND, M.D.

BICYCLE-RIDING with the common saddle, such as is sold with most wheels, causes a disease of the prostate and urethra the severity of which is in proportion to the amount ridden and the relation of the buttocks and perineum of the rider to the saddle.

This is a subject which I have studied considerably, having been led to do so by the number of patients coming to me with prostatic and urethral irritability who denied venereal history. This denial in some subjects must be accepted *cum grano salis*, but there have been some under my observation whose honesty was beyond question.

The prostate, lying as it does in the perineum, being covered only by the perineal fascia, fat, skin, and rectum (sometimes loaded with hardened fæcal masses to add to the trouble), is exposed to concussions, and these are inflicted by saddles which fit the perineum, and upon which a small portion of the buttocks rests.

E. F. H., bookkeeper, was referred to me by a physician who had been treating him for an irritability of the urethra, principally the membranous. Endoscopic examination of the bladder was negative. The prostatic urethra presented the caput gallinaginis swollen, the mucous membrane livid, velvety, and sensitive to pressure. The membranous portion was swollen, and exhibited a few small erosions; the bulbous contained numerous granulations. By rectal palpation and other physical and rational symptoms, a diagnosis of chronic parenchymatous prostatitis and granular urethritis was made, and a cause looked for. Venereal history was denied absolutely. Upon questioning him closely, I found that he rode a bicycle to excess, riding forty and fifty miles at a trip. After such a ride, the only inconveniences that he experienced were frequency of micturition and dysuria. Examining the saddle used by my patient, and placing him on it in the position such as he would assume when riding, I found him to be resting the entire weight of his body on the perineum, the buttocks merely resting upon the back part of the saddle.

It is needless to say that I considered this the cause of the prostatic trouble, and at once interdicted the use of the wheel, and treated the trouble, which yielded readily.

This case is merely an illustrative one; I have had a number of others presenting the same symptoms and due to the same causes—*i.e.*, excessive bicycle-riding on improperly fitting saddles. When we consider the structure of the prostate gland, being as it is made up of delicate glandular and muscular tissue, is it not surprising that not more cases of prostatitis occur? What would be the outcome if the testicle was in the position of the prostate, and received the same amount of concussion—would not orchitis be the result?

In reviewing the literature, the only mention I can find of traumatism to the perineum being an etiological factor is that made by Dr. W. T. Belfield in his contribution to Morrow's "System of Genito-Urinary and Cutaneous Diseases." He states: "Injury to the perineum (horseback and bicycle riding) seems a possible cause."

It has been my experience so far to have seen more cases due to the bicycle than to "cold and damp."

I have used the wheel, and consider its use to be a most healthful exercise when taken in moderation and upon an anatomical seat. Such a seat so far I have never seen, so I cannot be credited with having the interest of any manufacturer at heart.

It is out of the province of this paper to speak of injury that is being done daily to our growing girls by the saddles now in use by them, but I cannot allow an opportunity to pass without condemning bicycle-riding for womankind until a proper saddle is devised.

When we consider the condition of the bulbous and membranous urethræ as discerned by the endoscope, is it not more than likely that stricture should follow in some of these cases? Stricture is always preceded by urethral inflammation, and if the mucous membrane becomes damaged sufficiently to allow of the escape of urine into the submucous tissue, plastic material is laid down to repair the injury, and by its cicatrization and contraction produces a perceptible diminution in the expansibility of that portion of the urethra, and stricture results.

Now these cases of contusion and concussion by the see-saw motion of the body over the hard horizontal bar (saddle), producing the congested urethra, offer a fertile soil for the formation of a stricture.—*N. Y. Med. Jour.*

PHYSICAL VERSUS MENTAL OVER-STRAINING IN CHILDREN.

By Aristides Agramonte, M.D.

At any time in life excessive and continuous mental exertion is hurtful; but in infancy, when the cerebral structures are still immature and delicate, permanent injury is more easily produced by injudicious treatment than at any subsequent period. In this respect the analogy is complete between the brain and other parts of the body, as is exemplified by the injurious effect of premature exercise of the bones and muscles. And I beg you bear with me while I relate an incident which illustrates the purport of this paper and led me to investigate a most transcendental error, that of mental over-stimulation in children.

During a visit to a friend in the country, I was enjoying a walk in the garden before breakfast on a delightful morning in June, when my attention was suddenly arrested by the pensive attitude of a little boy, the son of my host, whom I observed standing before a rose-bush, which he appeared to contemplate with much dissatisfaction. Children have always been an interesting study to me, and yielding to a wish to discover what had clouded the usually bright countenance of my little friend, I inquired what had attracted him to this particular rose-bush, which presented a forlorn appearance when compared with its more blooming companions. He replied: "This rose-bush is my own. I have taken great pains with it, and hoped to have had many fine bouquets from it; but all my care and watching have been useless; I see I shall not have one full-blown rose after all.

"After watching it for some time," he continued, "I discovered a very great number of small buds, but they were almost concealed by the leaves which grew so thickly; I therefore cleared away the greater part of these, and my little buds looked very well. I now found, as I watched them, that, although they grew larger every day, the green outside continued so hard that I thought it impossible for the delicate rose-leaves to force their way out. I therefore picked them open; but the pale, shrivelled blossoms which I found within never improved and died one after another. Yesterday morning I discovered one bud which the leaves had till then hidden from me, and which was actually streaked with the beautiful red of the flower confined in it. I carefully opened and loosened it in the hope that the warm sun would help it to blow. My first thought this morning was of the pleasure I should have in gathering my one precious bud, but look at it now!"

The withered, discolored petals to which the child pointed did indeed present a melancholy appearance, and I now understood the cause of the looks of disappointment which had at first attracted my attention. I explained to the over-zealous little gardener the mischief which he had unintentionally done by removing the leaves and calyx with which nature had covered and inclosed the flower, until all its beauties should be ready for full development; and having pointed out to him some buds which had escaped his care I left him full of hope that by waiting patiently for Nature to accomplish her own work, he might yet have a bouquet of his own roses.

As I pursued my walk it occurred to me that this childish incident suggested an answer to the question asked by Dr. Johnson: "What becomes of all the clever children?" Too often, it is to be feared, are the precious human buds sacrificed to the same mistaken zeal that led to the destruction of the roses which had been expected with so much pleasure by their little owner. Perhaps a few hints suggested not by fanciful theory, but gathered here and there from the practical experience of those better than I versed in mental and physical training of children, may help to rescue some little ones from the blighting influences to which they are too often exposed.

We have mentioned that the laws by which the physical development of every infant, during the earliest period of its existence, is regulated, seem to afford a striking lesson by the analogy they bear to the laws on which the subsequent mental development depends ; and by the wise arrangement of nature this lesson is made immediately to precede the period during which it should be carried into practice.

On the babe's first entrance into the world it must be fed only with food suitable to its delicate organs of digestion; on this depends its healthful growth and likewise the gradual strengthening of those organs. Its senses must at first be acted upon very gently; too strong a light or too loud a noise may impair its sight or hearing for life.

The little limbs of a young infant must not be allowed to support the body before they have acquired firmness sufficient for that task, otherwise they will become deformed and the whole system weakened ; and last, not least, fresh and pure air must be constantly inhaled by the lungs in order that they may supply vigor to the whole frame.

All family physicians should make their clients acquainted with these inexorable laws of nature ; all enlightened parents generally act on them ; but when, owing to judicious management, their children emerge from babyhood in full enjoyment of their animal organs and with muscles and sinews growing firmer every day in consequence of the exercise which their little owners delight in giving them, is the same judicious management extended to the mind, of which the body, which has been so carefully nourished, is only the outer case ? In too many cases it is not.

Children are sometimes met with, though few and far between, whose minds seem ready to drink in knowledge in whatever form or quantity it may be presented to them; and the testimony of Dr. Coombe, as well as of many other well-known writers, proves the real state of the brain in such cases and also the general fate of the poor little prodigies.

Such children, however, are not the subject of these remarks, of which the object is to plead for those promising buds which are closely encased in their "hard" but protecting covering ; to plead for them especially at that period when the "beautiful red streak" appears—in other words, when, amid the thoughtless sports and simple studies of childhood, the intellect begins to develop itself and to seek nourishment from all that is presented to it. There exists at the period alluded to a readiness in comparison and a shrewdness of observation which might be profitably employed in the great work of education. And here it may be observed that as to "educate" signifies to bring out, the term "education" can only be applied with propriety to a system which performs this work, and never to one which confines itself to laying on a surface work of superficial information unsupported by vigorous mental powers.

Too often the tender mind is loaded with information which it has no power of assimilating, and which, consequently, cannot nourish it. The mental faculties instead of being gradually exercised are overwhelmed; parents who would check with displeasure the efforts of a nurse who should attempt to make their infant walk at too early a period are ready eagerly to embrace any system of so-called education which offers to do the same violence to the intellect ; forgetting that distortion of mind is much more to be dreaded than that of the body, since no orthopædic appliance will straighten out an intellect which has developed more or less deviated from the right course.

Information may be acquired at any age, provided that the intellectual machinery has been kept in activity or not been overworked ; whereas if it has been allowed to rust or stiffen from disease or pushed till its bearings have worn out through constant friction, the efforts of the man (supposing him to have energy sufficient to make an effort) to redress the wrongs done to the boy will in most cases be in vain.

That self-educated men are generally the best educated is a trite remark, so trite, indeed, that it frequently falls on the ear without rousing attention to the apparent paradox which it contains, and yet there must be some reason well worthy of attention, for the fact that so many who, in early life, enjoyed advantages, have, on reaching manhood, found themselves surpassed by others who have been forced to struggle up unassisted, and in many cases surrounded by apparent obstacles to their rise.

It is obvious that the point in which the latter have the advantage is the necessity which they find for exercising their own intellectual powers at every step; and, moreover, for taking each step firmly before taking the next; which necessity, while it may retard the rapid skimming over various subjects, which is sometimes effected, gives new vigor constantly to the mind and also leads to the habit of that "industry and patient thought" to which the immortal Newton attributed all he had done; while at the same time a vivid pleasure is taken at the acquirement of knowledge so obtained, beyond any that can be conferred by reward or encouragement from others.

From these considerations it appears that the most judicious system of education is that which rather directs the working of the average child's mind, that works for him, at the same time that restrains or inhibits the cerebral functions of the unusually clever or physically enfeebled; and it must be remembered that such a system, compared with some others, will be slow, though sure, in producing the desired effect.

Every one familiar with children must have observed with what apparently fresh interest they will listen to the same tale repeated again and again. Now, if time and repetition are necessary to impress on the young mind facts interesting in themselves, they are surely more necessary when the information to be imparted is in itself dry and uninteresting, as is the case with much which it is requisite for children to learn. The system here recommended is one which requires patience and care on the part of parents and teachers; but care and patience so exercised would undoubtedly be rewarded by the results, one of which would be that we should not so frequently see "clever children" wane into very commonplace if not stupid men.

It is the duty of every family physician to observe the bent of each particular little patient's mind, and when, as in the case of an unusually bright child, in his opinion it is over-stimulated, to interfere and advise a less active system of education or even an inhibitory one if necessary. This is, in my opinion, as much his duty as it is to direct the feeding, or the clothing, or the general management.—*Ann. of Hyg.*

STUFFY ROOMS.

BEFORE many weeks are over we may expect the advent of that great period of tribulation and discomfort which in so many middle-class English homes takes the place of Lenten penance. We mean the "spring cleaning," and it is not without interest to inquire why rooms become so stuffy and disagreeable as to require this annual disturbance. The answer is plain—partly from neglect of daily dusting, partly from the very deficient ventilation entailed by the common love of warmth, partly by the offensive nature of the material used in producing that downy softness which fashion and love of luxury demand in our carpets, cushions, curtains, and furniture of all sorts. Dr. James Niven, Medical Officer of Health for Manchester, has been inquiring into the causes of death in the case of upholsterers, and after searching the record for 1895, he finds that 4 out of 6 died from infectious disease, which he attributes to the dust inhaled in their occupations. This brings out another evil arising from the dust-absorbing and germ-absorbing padding with which so much furniture is now stuffed. He says that the material with which the poorer class of chairs and sofas are stuffed is either cotton flock or rag flock, and that furniture stuffed in this way not infrequently finds its way into fashionable drawing-rooms. These rag flocks are often very dirty. They are obtained from poor households, middens, tips, etc., and many of them are filthy and infectious. In regard to them Dr. Niven says that they "must contain the infective matters of a number of diseases, amongst which must be specially mentioned tuberculosis, scarlet fever, typhoid fever, erysipelas, puerperal fever, and other forms of septicæmia." Can we wonder, then, that at the end of a long winter, when the exhalations and the dirt produced by many people have been absorbed by materials originally so foul, living-rooms tend to become foul, a spring cleaning is a necessity, and that those who do the beating find the process far from healthy? The fact is that modern furniture is incapable of being cleaned. So long as the furniture was made of wood which could be dusted and polished all over, and all necessary softness was furnished by cushions which could be removed and pulled to pieces for cleaning purposes, a spring cleaning, however peace-destroying it might be, at least produced cleanliness. The introduction of spring seats, however, has changed all this, and it is no exaggeration to say that, from the time it is made to the time when it is returned to the upholsterer for recovering, modern furniture is never cleaned. We cannot wonder, then, that rooms are stuffy.—*Brit. Med. Jour.*

PUBLIC LIBRARIES AND INFECTIOUS DISEASE.

Dr. Armstrong, Medical Officer of Health for Newcastle-upon-Tyne, informs us that the system adopted in that town for the prevention of infection is for the sanitary inspector, in making his usual investigations, to inquire also as to the use of books from the libraries. In case the people in the infected house are in the habit of using such, a notice is given warning them not to do so until after the termination of the case and the disinfection of the house, and a notice is also sent to the library informing the librarian of the presence of infectious disease, warning him not to issue books to that house or receive them back until a certificate of final disinfection is forwarded from the health department, and, in case books are found on the infected premises, informing him that they have been taken possession of by the sanitary inspector, and will be disinfected before they are returned. Dr. Armstrong, however, does not say by what process this disinfection is carried out, which at the present moment is a matter of considerable interest. It seems, however, a very proper proceeding for the sanitary authority to take upon itself the disinfection of books, just as it would of other articles found upon the premises, and it is certainly a much better plan than that of leaving such duties to the library officials.—*Brit. Med. Jour.*

THE PREVENTION OF OPHTHALMIA NEONATORUM.

At the last meeting of the Medical Society of the State of New York a special committee—Drs. Lucien Howe, of Buffalo, Peter A. Callan, of New York, and W. C. Wey, of Elmira—was appointed to call the attention of nurses and midwives to the law regulating their duties in cases of purulent ophthalmia of infants, and to report to the proper authorities cases in which this law is violated. This law is a part of Chapter 361 of the Laws of 1892, and reads as follows:

"Being a midwife, nurse, or other person having the care of an infant within the age of two weeks, neglects or omits to report immediately to the health officer, or to a legally qualified practitioner of the city, town, or place where such child is being cared for, the fact that one or both eyes of such infant are inflamed or reddened whenever such shall be the case, or who applies any remedy therefor without the advice, or except by direction, of such officer or physician," etc.

In New York City, the Society for the Prevention of Cruelty to Children has, at the instance of several physicians, prosecuted cases of violation of the statute. The following are taken from the Records of the Society:

"Case No. 77,605.—Mrs. Minnie Schneider, of 508 East Twelfth Street, attending a child of Mrs. Louis Wageman, of 356 East Tenth Street, was tried for violating this law, was obliged to give bail for $300, and was fined $5."

"Case No. 80,156.—Wilhelmina Schenlin, of 457 West Forty-ninth Street, attended a child of Mrs. Mary Wildey, of 507 West Forty-eighth Street, was found guilty of its violation, April 11, 1894, and fined $25."

"Case No. 81,821.—Anna Kotil, 218 East Third Street, attended a child of Anna Biza, of 120 East Third Street, pleaded guilty, June 22, 1894, and was fined $100."

"Case No. 94,949.—Fanny Greenstein, 295 Stanton Street, attended the infant child of Mrs. Kate Daub. The child became practically blind. The midwife pleaded guilty and was fined $25."

These cases of blennorrhœa of the newborn child were undoubtedly all sacrificed through the ignorance of the attending midwife, and might have been saved had they received prompt treatment. The value of the law of 1892 is here amply demonstrated, and it is a fortunate thing for this great city that the Society for the Prevention of Cruelty to Children stands ready to prosecute offenders under this statute.—*N. Y. Med. Rec.*

THE DANGERS OF "MADE LANDS" OF CITIES.

THE *Medical Press and Circular*, January 15, contains a summarized report of one of the health officers of an eastern district of London on the unsanitary condition of houses that have been built on ash-heaps or filled-in ground.

"The medical officer of health for Hackney has once more called attention to a besetting sin of jerry-built houses. In a lately issued report he pointed out that many of the houses in his district were built upon a layer of house refuse, which in turn rested upon a bed of clay. Such a condition of affairs naturally leads to the drawing into the house of various gases of decomposition and of other components of ground air. This danger has been discussed in our columns for many years past. That it is a common and fruitful source of disease can scarcely be doubted. In many parts of the suburbs of London it is a constant practice of the enterprising builder to fill up with ash refuse any pit that has been quarried for stone, sand, or other material. He then proceeds to run up a more or less showy villa on this green mass of miscellaneous animal, vegetable, and mineral stuff. As a rule, the basement is not provided with an impermeable concrete flooring, so that the house settles, the drains are dislocated, and the inside of the house becomes permeated with poisonous ground air. The remedy is simple. No new house should be occupied until it has been duly inspected and certified as properly constructed by a competent sanitary authority. At present, the remedy which the tenant of an unhealthy dwelling has against his landlord is slow, tedious, and uncertain. The advent of some searching and practical domestic legislation would speedily put an end to the ghoulish race of jerry-builders."

THE SANITARY MANAGEMENT OF FLOORS AND FLOOR COVERINGS.

To those who know the true inwardness of things the sight of a housemaid brushing a dusty carpet is suggestive of many evils. The death of Pasteur has reminded the world of what is constantly present in the thoughts of medical men, namely, that while micro-organisms are the great producers of disease, dust is the great carrier of micro-organisms. Now that we know these things, now that we understand that in the quiet hours of night the germ-laden dust settles down upon the floor, it is distressing to find how little our knowledge is put to practical use, and to see old customs still unchanged, old habits which we know to be destructive carried on, and to find the housemaid on her knees, with her brush and dustpan stirring up dust to the detriment of every one, and breathing germ-laden particles to her own destruction. It needs but a small amount of common sense to see that if carpets must continue, a thing greatly to be deprecated, they should be rubbed with a damp cloth rather than brushed, and that if, in deference to prejudice, they must be brushed, this should be done by a covered American sweeper with plenty of damp tea leaves. Of all ways of removing dirt from a carpet the worst is by the ordinary short brush, which involves the housemaid's kneeling down in the midst of the dust which she so needlessly creates, and drawing it into her lungs with every breath. For ordinary household use something like linoleum, something which can be washed with a wet cloth every morning, would seem to be the best covering for floors; but if carpets must be, and if it is impossible to teach the present generation the evils of seeking present comfort at the expense of future risks, at least let us remember that carpets may be washed even where they lie; that, till the day of washing comes, a closed sweeper is far better than a brush, and that the worst form of brush is one with a short handle.—*Brit. Med. Jour.*

THE INFLUENCE OF HOT AND COLD DRINKS ON THE TEMPERATURE IN THE MOUTH.

To the Editors of the Lancet:

SIRS: In *The Lancet* of Oct. 26, Dr. Lazarus Barlow drew attention to the influence of hot and cold drinks on the temperature in the mouth. I have often thought that one might easily be misled if the temperature were taken in the mouth too soon after food. Two instances which have recently occurred to me show this. A few weeks ago I saw a boy suffering from tonsillitis. His mother, a few minutes before my arrival, had taken his temperature in the mouth and found it to be 102° F. I took it in the mouth and found it to be 100°. Our thermometers were tested and found to agree. On inquiry I found that he had had some hot beef-tea just before his mother took his temperature. The second instance occurred yesterday, when I saw a boy who had symptoms of influenza. Immediately on going into the room I put my thermometer in his mouth, when it registered 104°. Doubting the accuracy of this, I put it under his arm and found it registered 99°. After waiting a little while I put it in his mouth again, and found it registered 100.2°. Just before my arrival he had taken a glass of very hot milk. These two cases show how easily one may be deceived if one trusts entirely to the thermometer.

I am, sirs, yours faithfully,
W. GIFFORD NASH.

BEDFORD, Nov. 6, 1895.

—*London Lancet.*

DIET IN THE ETIOLOGY AND TREATMENT OF DISEASES OF THE SKIN.*

THE author suggests that the practice of physicians is not based upon sound knowledge in regard to the subject of diet in relation to skin diseases. The author considers that the influence of diet in the causation of skin diseases is a small one, and that substantial knowledge of the subject is limited. Diet may influence the skin by influencing the general nutrition; by acting as a reflex stimulus from the gastro-intestinal tract; by absorbing into the blood irritating substances or products of chemical change which indirectly affect the skin; or the skin may suffer by affording one of the avenues of elimination. The author concludes that the best advice to give patients who are suffering from diseases of the skin is that they are moderate in regard to eating and drinking, and especially that they are careful in regard to alcohol. They are also to observe carefully if there are any special articles of food which do not agree with them. The author gives the following rules:

1. Very few skin diseases are directly traceable to dietetic causes, but improper

---

* Walter G. Smith (*Brit. Jour. Dermat.*, 1895, vii., p. 309).

diet may aggravate existing eruptions. Idiosyncrasy must be largely allowed for.

2. The diseases that may so arise are of a transitory character, and mostly belong to the class of erythemata.

3. Diet has very little influence in promoting the cure of cutaneous eruptions. The results are far behind popular expectations, even in such cases as acne rosacea, where we are led to hope for much.

4. Avoidance of alcohol, regulation of the bowels, and the cure of anæmia are of infinitely greater importance than special dieting in the management of diseases of the skin.—*Am. Med.-Surg. Bul.*

◆

SEROTHERAPY IN SYPHILIS.*

At the meeting of the Biological Society, Paris, April 6, 1895, Héricourt and Richet reported that they had treated by injections of serum a case of tertiary syphilis with ulcerating gummata of the leg. The serum employed was taken from an ass who had received 20 ctm. of blood from a patient who had syphilis in the secondary stage. The blood injection antedated the serum injection by 54 days. In three and one half months there had been no improvement in the patient in spite of general and local mercurial treatment. In 18 days 13 injections were made. Cure was complete in four weeks.—*Am. Med.-Surg. Bul.*

◆

STATISTICS OF SEROTHERAPY IN DIPHTHERIA IN GERMANY.

Prof. Behring delivered a recent address on this subject in which for the first time he replied to the swarms of critics who have been attacking him the past year or so. He maintained that statistics prove the efficacy of his serum, and that the 60,000 deaths from diphtheria which the empire has averaged each year will be found to be reduced to 40,000, and a more general use of the serum would reduce this to one-third. Throughout the city of Berlin the fatality in diphtheria amounted to 30 per cent., but in the Contagious Hospital, where serum was promptly used, the mortality was only 20 per cent. In the same time in 1895 it was only 10.3 per cent. The mortality in the hospitals had always been much greater than outside heretofore. Last year the percentage of mortality in diphtheria cases in Berlin fell to 15 per cent. During this period the disease was not a mild form, but averaged more morbid symptoms than at any time since 1886. During the first three months of 1894, when the serum was not to be had, there were 363 deaths per 1000, while the last three months, when everybody could get the serum, there were 198 deaths per 1000. Summing up the figures, there were 10,312 diphtheria cases reported; 5833 treated with serum, with a mortality of 9.6 per cent. In 4479 cases it was not used, and the mortality was 14.7 per cent.—*Jour. Am. Med. Ass'n.*

◆

THE INFLUENCE OF THE NERVOUS SYSTEM ON INFECTIVE PROCESSES.

Trambusti and Comba (*Lo Sperim.*, An. 49, fasc. 3) have carried out a series of experiments on rabbits with the object of finding out what influence changes in the nervous system have with regard to the localization and course of infection. The organ chosen by them was the kidney, whose nervous supply they seriously affected by extirpating the inferior ganglion of the cœliac plexus. After this operation they injected cultures of streptococcus erysipelatis into 5 rabbits and cultures of staphylococcus pyogenes aureus into 7 other rabbits. Eleven of these animals died in from 2 to 28 days, and on examination it was found that in every case the micro-organism had selected the kidney by preference, whereas in control animals the kidney was unaffected. From their experiments the authors conclude that injury to the nerves of an organ predisposes it to infection, and that vasomotor paralysis, instead of being a protection, as some authors have said, against infection, rather predisposes thereto. Since there was no microbic localization in the liver the authors hold that this organ receives its nervous supply from the superior cœliac ganglion and not from the inferior.—*Brit. Med. Jour.*

---

* Héricourt and Ch. Richet (*Bull. méd.*, 1895, ix., p. 342).

SEROTHERAPY IN THE TREATMENT OF CANCER.*

A NUMBER of French observers have been experimenting with this treatment, and although they have not succeeded in effecting a complete cure, yet what they have accomplished is remarkable. 1. In the fifty cases they studied, the pain subsided immediately, and this unexpected phenomenon lasted during the entire course of treatment. 2. The ulcerations improved, healthy granulations and scabs formed, while the tendency to bleeding diminished. 3. The swellings grew smaller, the infiltration of the neighborhood ceased, the infiltrated glands shrunk, and the entire cancer often showed considerable decrease in size. 4. In the severest, most hopeless cases, the development of the cancer seemed definitely arrested. 5. The general health improved.

Three months of this improvement were followed by a stationary stage. After a while new knobs were found near the almost healed centre, but their development was very slow. The injections produced slight exanthema in a few cases. They were followed by syncope in four, but all phenomena tend to prove that the course of the cancer was very much delayed by this treatment.—*Jour. Am. Med. Ass'n.*

ANTI-TYPHOID SERUM.

IN the course of a communication to the Paris Société de Biologie on February 22 on the "Early Diagnosis of Typhoid Fever by a Bacteriological Examination of the Stools," M. Chantemesse said that last June he had succeeded in immunizing several horses against the virus of typhoid fever. He had obtained the serum of such strength that one-fifth of a drop inoculated into a guinea-pig twenty-four hours before infection protected it against a dose of typhoid virus fatal to animals not previously injected with the protective serum. It was ascertained, also, that injections of the serum produced no injurious effects upon a healthy man M. Chantemesse stated that he had since employed injections of the serum in three cases of typhoid fever. The temperature showed a regular fall from the time the first injection was made, and seven days after the commencement of the injections all three patients were quite free from fever, and had commenced to convalesce. M. Chantemesse added that the cases were not yet sufficiently numerous to permit any trustworthy conclusion to be drawn.—*Brit. Med. Jour.*

FOOTBALL CASUALTIES.

DURING a game at Sparkhill on Saturday last a player ruptured his kidney and was admitted to the General Hospital. On the same day, in the course of a match at Swansea, between the Swansea and Cardiff teams, a player fractured his clavicle; and at Rochdale, in a match between the Athletic and Spotland clubs, three members of the former club received injuries. One sustained a fracture of his patella, another an injury to his arm, and the third a fracture of his skull. Unfortunately the latter became unconscious and died the following day.—*Lancet.*

BACTERIOLOGY IN EGYPT.

DR. ARMAND RUFFER has been appointed Professor of Bacteriology in the Medical School at Cairo. While congratulating the professors of that school on obtaining so able a colleague, we may felicitate Dr. Ruffer on his appointment to a post which appears to be in many ways a most desirable one. A pleasant climate, a good salary, a fair amount of annual holiday, a well-appointed laboratory, a growing school in a progressive country, together with the fact that Egypt is a sanitary outpost of Europe and that bacteriological work done there will constantly be of European importance, all combine to make the post acceptable to men of the highest talent. Dr. Ruffer's resignation of his present office of Director of the British Institute of Preventive Medicine has been accepted by the Council with many expressions of regret, and we understand that he will shortly proceed to Egypt, where he will at once commence his new work.—*Brit Med. Jour.*

---

* *Centralblatt für Chirurgie*, Jan., 11, 1896.

A NEW ERA OF SANITATION IN INDIA.

We observe that the *British Medical Journal* has an article headed "A New Era of Sanitation in India," in which Sir Anthony Macdonell is given the credit of the changes to be introduced in the sanitary system of India. Sir Anthony has always taken a lively interest in sanitary matters, and possibly this has misled the editor. If, however, the dates of the two important resolutions be borne in mind, it becomes obvious that Sir Anthony Macdonell had nothing whatever to do with the scheme. He was not in the Home Department at the time when the subject was considered. The head of that department was Sir Alexander Mackenzie, the present Lieutenant-Governor of Bengal, and it is entirely due to Sir Alexander's interest in sanitation and influence in the Council that the subject obtained a proper hearing, and that the scheme has assumed such broad and statesman-like proportions.—*Ind. Med. Gaz.*

BOOK REVIEWS.

Dame Fortune Smiled. The Doctor's Story. By Willis Barnes. 334 pages, cloth, $1.25; paper, 50 cents. Arena Pub. Co., Boston, Mass.

It is not quite the province of the Gazette to notice in its reviews a novel dealing with imaginary people, who generally form the characters of such books. The book before us, however, is an exception. We find it quite appropriate to the Gazette, whose province it is to promote the science of hygiene.

The story before us deals with hygienic suggestions of great value for those who work under high nervous tension. The doctor who tells the story gives us his experience with patients who have been Wall Street and railroad scheming money-makers; they have come out of the struggle with impaired health almost to the verge of nervous prostration. These men are shown the folly of pursuing the mad intoxication of money-getting simply for the mere gratification of the passion of possessing.

Having convinced his patients of their folly and restored them to as near normal health as their dissipation of vital status will permit, he then by mental suggestion and improved environment turns these getters of money into givers. Large sums are provided by his wealthy patients for the promotion of medical science and the erection of a model rest home, for the treatment of nervously and mentally broken down men and women. Then a great trust is created for the benefit of railway employees, to which $15,000,000 is given. Then a great music hall is built for the workingman and his family. This beneficence is called the *Gold Trust*.

Then there is the *Savory Trust*, providing for art galleries in various towns and cities throughout the country, and it is provided that they shall be open to the public every day in the year. And finally the richest woman in America, Mrs. Black, gives vast sums of money for beneficence. The real purpose of the story, however, is to show that life is worth living, that great millionaires should stop accumulating and treat their wealth as a public trust, as the distinguished millionaire philanthropist Andrew Carnegie asserts should be the case.

The doctor shows that those who administer upon their own estates will live longer and derive uncommon pleasure from giving, and thus insure the accomplishment of their desires, which, if confided to trustees under a will to be carried out post mortem, will most likely be defeated by courts of law upon the merest technicality.

Every doctor or lay reader of the Gazette, every rich man or woman, indeed every one interested in the bettering of humanity, will find themselves much benefited by reading "Dame Fortune Smiled."

Dunglison's Elementary Physiology, 208 pages, 50 cents, and Dunglison's School Physiology, 336 pages, $1. By Richard J. Dunglison, A.M., M.D. Published by the Werner Co., Chicago and New York.

Human beings know something of almost

everything in this world pertaining to the heavens above and earth beneath. Men and women have some knowledge of the affairs pertaining to the every-day life, their environment, and the details of money affairs, and how to build their houses and decorate them. But of themselves, of this complex organization, the human body, the great mass of the people know very little. Why should this ignorance be so broadcast? Surely the school-master has not been abroad, but patiently sitting in the halls of learning, ever ready to impart the lessons pertaining to the mechanism of the body and its functional action. In the two books here noticed will be found lessons which should be drilled into the mind of every child from the minute they are able to understand the difference between the arm and the backbone, the heart and the liver, or the stomach and the brain. The anatomy and physiology of the human body are clearly described, and the dangers to be avoided, that health may be preserved and life promoted, are intelligently set forth.

Of the use of alcohol, tobacco, and narcotics, Dr. Dunglison writes as follows:

"The child, when once taught the formation of its own body, and how necessary it is to observe the laws of health, cannot fail to regard these poisons and the vicious habits resulting from them as fertile sowers of disease. By their injurious influences these undermine the mental and physical health of individuals and communities, and lead by paths of crime and suffering to lives of poverty and wretchedness."

Instill such salutary lessons into the plastic minds of youth, and they are likely to retain this knowledge even unto old age.

Ye Thoroughbred. By Novus Homo. Three interviews: 1st, Man as an Animal. 2d, Man as a Magnetic Battery and an Electro-Telegraphic Machine. 3d, Man Americanized—the Great Republic: its Status and its Future. 12mo, paper, 129 pages. Published by the Health-Culture Co., New York.

The disappointment that comes from reading this book arises from the fact that it is only 129 pages of matter, and that these pages contain far too few words. The argument is a plea for the breeding of a higher grade of men and women. Almost all other animals, even cats and canary-birds, are carefully bred by the selection of the highest orders of their class in personal appearance and demonstrated intelligence. But who ever thinks of selection when the mating of human beings takes place? Men and women with deteriorated bodies marry, and entail misery on their offspring which a lifetime of suffering cannot efface. Many diseases are directly entailed, while weakened constitutions of the children, through the fault of parents, make them easy victims of any passing disease-creating germ. All this might be avoided by the self-denial of diseased or weakened men and women refraining from entering the marriage state. We regret that Novus Homo has not written more of a book on the breeding of man; more detail, more facts, and more illustrations would have served a good purpose, and it is to be hoped a second edition of this most suggestive book will be written, extending the argument over a wider field. As it is, however, we heartily recommend every one to read the lessons in the three interviews set forth.

Words as They Look, and How to Spell Them. By William C. Hyde. The Werner Co., Chicago and New York. 50 cents.

In these times of writing-machines and stenographers, when letters and writings of every description are simply dictations, the art of spelling is likely to be forgotten. Spelling is largely dependent upon our memory as to how a word looks when correctly spelled, for we learn to spell with our eyes. For a companion of the writing-desk Mr. Hyde's book is a most acceptable acquisition. It is not a dictionary. It is simply a compilation of 25,000 words in common use. The plan is to spell the word with the doubtful letter or letters in bold-faced type.

Electricity in Electro-Therapeutics. By Edwin J. Houston, Ph.D., and A. E. Kennelly, Sc.D. Elementary Electro-Technical Series. 372 pages, and a very extended index. There are a large number of illustrations. Published by the W. J. Johnston Co., New York.

The use of electricity as a therapeutic measure has come to stay, and there are many busy practitioners who will be glad to possess this new book, which is a most complete guide and educator in the subjects treated.

THE

DIETETIC AND HYGIENIC GAZETTE

A MONTHLY JOURNAL OF PHYSIOLOGICAL MEDICINE

VOL. XII. NEW YORK, MAY, 1896. No. 5

THE USE AND ABUSE OF CONDIMENTS.

BY J. HOBART EGBERT, A.M., M.D., PH.D.,
HOLYOKE, MASS.

CONDIMENTS are those accessory alimentary substances which give piquancy and flavor to food and which stimulate the functional activity of the glands of the mouth and stomach. Their dietetic value is at once evident. Referring to condiments, Pavy, in his "Treatise on Food and Dietetics," says: "Without being strictly alimentary substances, they nevertheless play no insignificant part in the alimentation of man, and prove of service in more ways than one. Their first effect is to render food more tempting to the palate, and thereby increase the amount consumed. We are guided in the choice of food by taste and smell, and that which agreeably affects these senses excites the desire for eating. Condiments are employed for this special purpose, and thus a flagging appetite receives a stimulant. Through their aromatic and pungent qualities they also assist digestion, the *modus operandi* being by promoting the flow of the secretions and increasing the muscular activity of the alimentary canal."

In view of the general commendation of eminent authorities, we may admit without question the dietary value of condiments. But this is not all. This class of products undoubtedly possess remedial properties, while they are also capable of injuring health when inordinately or injudiciously employed. Undoubtedly the abuse of condiments is a factor of some importance among the general causes of ill-health; while their curative virtues, when intelligently added to a selected diet, is a matter of considerable moment to the invalid.

In general, we may assume that a too liberal use of condiments prevails. While they will most certainly give tone and vim to a debilitated stomach, when its functions are temporarily depressed, their continued employment is likely to increase the very debility which they are desired to remedy. How many there are who, in order to stimulate their appetites, began by taking an occasional spiced drink before the morning meal and can now eat *no* breakfast without their morning cocktail. Thus, present relief is frequently obtained only at the expense of future suffering; for, in order to accomplish the desired result, the dose of the condiment must be continually increased as the digestive apparatus becomes habituated to the impressions of the agent, until there comes a time when a limit must be put upon this increase and the stomach, deprived of the stimulus upon which it was wont to depend, becomes powerless to accomplish its duty in the physical economy.

But not upon the alimentary system alone are the ill-effects of the injudicious use of condiments manifested. Nervous, circulatory, and general systemic injuries may result. Let us glance for a moment at the general effects of those condiments which yield to the system a pungent, volatile oil—the spices. These agents, in common with condiments in general, exert a local irritating effect upon the glands which secrete digestive fluids, increasing their activity and thereby augmenting the appetite and promoting, to a degree, the solution of alimentary substances; but they also increase the destructive metabolism of the body. General organic stimulation results from the liberal use of this variety of condiments, as they yield to the blood their volatile essence. The circulation is quickened, even the assimilation of digested food-stuffs is accelerated, and tissue nutrition becomes more active; the natural desire for sleep is delayed, the passions are aroused, and a general organic exaltation of the system ensues. We have just observed that under the liberal use of aromatic condiments tissue changes proceed with greater activity, but even under this forced stimulation the destructive processes of the body exceed the reconstructive, and while there is undoubtedly an increase in tissue nutrition there is a still greater increase in tissue consumption. Stimulation of the central nervous system lends temporary force to mental powers, and it is not wholly a fiction that mustard and allied substances increase the activity of the mind. But here, as with stimulation of the physical powers, reaction occurs and prolonged indulgence leads to mental depression and nervous irritability.

The aromatic and stimulating condiments—cinnamon, nutmegs, cloves, caraway, pepper, ginger, curry, vanilla, thyme, fennel, garlic, etc.—cannot be considered restoratives, as they do not impart to the blood an essential constituent of the body; they are stimulants, and whatever stimulates renders over-stimulation possible, and frequently bears injurious reaction in its train. The continued stimulation of the animal and general vital forces through the more or less constant use of an aromatic and stimulating diet sooner or later affects the general temperament of individuals and even influences posterity. In this connection, that eminent German authority on dietetics, Professor Moleschott, once said: "When we consider the restless passion, the choler and insidious jealousy of those inhabitants of the tropics who take so great an abundance of spices with their food, we find it impossible to forgive the cruelty with which the Europeans of a former day sought to enrich their own part of the world with pepper and cinnamon, with cloves and nutmeg. Had they never possessed any of these spices, the people of Europe would have one superfluous, and often obnoxious, addition to their food the less; and the Spaniards, Portuguese, and Dutch would be able to erase a bloody page of their history."

With this brief general survey of the more obvious effects of condiments upon the physical economy, we shall endeavor to point out the practical relations which they bear to health and disease.

Foremost among condiments is usually mentioned common salt, but properly speaking salt is a condiment only after it has been used in quantity to exceed the amount required for maintaining its due proportion as a normal constituent of the tissues of the body, previous to which it must be regarded as a food. Salt is present in every part of the human frame, organized in the solids and dissolved in the fluids. In the body of an ordinary sized man there usually exists nearly half a pound of salts of various kinds, chiefly common salt and allied compounds. These salines are constantly being excreted through the skin, the kidneys, and the bowels, and must be regularly replaced by new supplies in the food, in order that the alkalinity of the blood may be maintained, the hydrochloric acid of the gastric juice duly supplied, and the various processes of osmosis readily carried on, and while catering to these demands of the system salt is essentially a food. But salt is one of the most useful of condiments, for it not only increases the palatability of food but materially promotes the digestion of albuminous substances and aids the absorption of the scantily soluble fats. Haller declares that almost all nations understand the use of salt in alimentation, although their ways of using it sometimes differ. We read that when Cook and Forster visited, in 1772, the island of Otaheite, the natives were astonished to see the crew at dinner dipping their food into "a white powder," and yet they at the same time ate their fish and meat with a sauce of sea water containing common salt in abundance. In the Odyssey, the wise Ulysses is told on one occasion to renew his wanderings and continue them until he finds a people who have no knowledge of the sea and who do not season their food with salt. Patients who "raise" blood, either from the stomach or lungs, should not neglect salt from their diet; while those suffering from dyspepsia and chronic gastric catarrh may find relief in the more liberal salting of their food.

Next in order of consumption comes black pepper, the propriety of the liberal and constant use of which with food may justly be questioned. It is a typical stimulating aromatic condiment, and what has already been said of these agents as a class applies to this product individually. That pepper is not harmless is shown by the fact that when taken in excess it induces intestinal inflammation, burning pain in the epigastric region, great thirst, and sometimes vomiting. In several cases which have been recorded (according to Dr. Phillips), the immoderate use of pepper has even been followed by rigors, convulsions, and delirium. The general table use of pepper should be lessened, and among the plethoric even entirely discontinued. In paralyses which require an active stimulant; in weakened and reduced conditions of the system resulting from chronic debilitating affections; for those of asthenic and leucophlegmatic temperament, and in atonic dyspepsia, black pepper, in moderate quantities, is a fitting condiment.

Cayenne, or red pepper is a condiment of stimulating and irritating properties and is possessed of curative virtues. We recommend its use, as a condiment, to those disposed to malarial attacks; to weakly and overtaxed subjects suffering from atonic forms of dyspepsia, as a curative agent in chronic diarrhœa, and preventive of cholera, and as a general substitute for alcoholic stimulants for those addicted to their use.

Mustard is in general use as a condiment; nevertheless it would doubtless be better to confine its use to the methods of curative dietetics. In certain forms of indigestion with constipation, torpid liver, and loss of appetite, *good* mustard used as a condiment may prove of value, but its general table use should be discouraged. Owing to a mild expectorant action when taken in small quantities, mustard with food has been recommended in chronic catarrhal bronchitis and allied disorders of the lungs.

Vinegar is a condiment of value, as it not only stimulates digestion, but also exerts a direct solvent action upon certain ingredients of our food. It readily transforms the glutin and fibrin of albuminous substances into a loose gelatinous mass, and is capable of transforming cellulose and starch into sugar. Thus, we are ready to admit that in the majority of instances vinegar is an allowable condiment, providing a fairly pure cider or wine vinegar, entirely free from sulphuric acid, is employed. Theoretically, at least, vinegar should not be added to peas, beans, and lentils, and to soups made of same, as it not only will not dissolve the legumin which they contain, but renders its solution more difficult. With the exception of legumin, albuminous substances are dissolved by vinegar, and this solvent effect is carried even as far as the blood. Owing to the solution of constituents of the blood, and the resulting increased liquefaction, vinegar has been used to reduce corpulence—which it may indeed effect, though its use for this purpose can hardly be recommended.

We now pass to those accessory articles of diet, concerning which Bacon wrote: "As for radish and the like, they are for condiments and not for nourishment." Watercress, radish, parsley, onions, leeks, and similar vegetables, which are served fresh, are proper appetizers, also breaking the monotony of a limited diet and stimulating digestive processes. They undoubtedly constitute the best variety of condiments—or accessory food products—for general use.

Olives, pickles, chow-chow, and simliar spiced and pickled products, are to be regarded as harmful or beneficial according to the kind and amount of condiments they represent. Grated horse-radish may be mentioned as one of the best condiments to assist in the digestion of heavy meats, as pork, etc. The vinegar which is added to horse-radish increases its digestive qualities. Ketchup, meat sauces, and dressings are allowable when the appetite requires encouraging and the body needs stimulating, but their causeless and continuous use is decidedly wrong. Apoplexy and even insanity are perhaps engendered by the unwarranted use of heating, stimulating condiments.

In conclusion, we would add that the use of condiments generally, when not employed for a definite purpose, should be discouraged. During convalescence from acute illness, in conditions of temporary debility of the digestive functions, during the decline of advanced old age, and for the relief of definite disorders as already pointed out, good results may follow the judicious use of condiments. Thus, by their proper application to abnormal conditions, the quality of the blood may be improved, the body may be invigorated and strengthened, and supplied with better digested and more easily assimilated food; while, on the other hand, their irrational and immoderate use weakens both mind and body, predisposes to disease, renders the passions more ungovernable, and shortens life. It is not necessary that all should forego the use of condiments with their food, but it will be well for most people to exercise due judgment in their selection as well as to limit the quantity consumed, ever remembering that "an excess of stimulants is much more dangerous than a superabundance of nutriments."

PSYCHICAL INFECTION: REMARKS UPON THE PROBABILITY OF A MENTAL CONTAGIUM.*

By Henry S. Stark, A.M., M.D.,
NEW YORK.

WHILE it is no part of my purpose to enter into an elaborate discussion of the pathology of the mind, but rather to call attention to that particular phase of it which furnishes the subject-matter of this paper, nevertheless such a work would be much to be desired; for I find after a careful survey of the literature of the subject that there is no contribution on mental pathology which can be styled, according to newspaper phraseology, *fin-de-siècle*, that is, up-to-date, or one that covers the entire ground.

In this ultra-bacteriological era it should occasion no surprise that so many new fields of speculation and study should be constantly opened up, for this theory of infection is rapidly assuming such proportions that we cannot ignore its influence on medical thought any longer. Glance at the trend of recent medical activities, of present investigations, and the conclusion is forced upon us that the theory of infection is playing the leading rôle. Scarcely a generation since Lister, Schwann, Tyndall, and Pasteur startled the scientific world with their discoveries, and yet the whole gamut of the medical sciences has been revolutionized to conform to their views.

The presumption that mental or physical infection is a possibility rests on the close analogy between mind and matter in all their operations and phenomena, from both a physiological and a psychological standpoint. Admitted that material or physical infection is and has been proven, it no longer savors of the Utopian to believe that one mind may infect another under certain favorable conditions. Under the circumstances, then, even the most sceptical will be compelled to admit its plausibility. This theory of psychical infection, although foreshadowed by the germ theory, has not yet taken on a scientific aspect, for the simple reason that systematic attention was never directed toward it. It is therefore the writer's object to focus your attention by means of this article on this psychological creation and innovation in the realms of speculative medicine, in the hope that this theory may be worked out in detail and that possibly something permanent may be the practical outcome in the way of treatment for certain diseases and anomalies of mind.

---

* Read at the meeting of the Section on Neurology of the New York Academy of Medicine, December 13, 1895.

The term "psychical or mental infection" is used by me in contradistinction to material or physical infection. The two varieties are not at all incompatible; on the contrary, they are frequently coexistent.

In physical infection the following assumptions are inevitable, and it will be apparent that nearly the same are applicable, only in a different guise, in psychical infection:

First, there must be the infecting agent.

Second, there must be the *contagium* or *materies morbi*, so-called.

Third, there must be an infected agent.

Fourth, there must be the medium of infection.

Consider for a moment the character of these conditions, and you will admit that they can be duplicated in the psychical sphere.

First, in place of the infecting agent we have what I might properly term the conveying or objective agent. In place of the infected agent we have the passive or receptive or subjective agent. The medium of infection is the mind in all its component parts—intellect, will, judgment, etc. It is in relation to the contagium only that a bone of contention could reasonably arise. Now, the essential distinctions between mind and matter are not even to-day sufficiently understood to enable one to ascribe to each its whole range of properties and aspects. It is on this account that psychical infection is not entitled to more credit than to be called a theory. Nevertheless it by no means follows that because we cannot explain the *modus operandi* by which all the varied phenomena of mind are produced they are of doubtful existence. If that were the case, all phenomena of whatever nature that could not be accounted for at random would of necessity be relegated to the realms of scepticism, while the whole fabric of reasoning would be swept into an everlasting oblivion. There are many truths and facts in science which cannot be explained, yet cannot be discredited. Time and time again the mysteries of yesterday became the revelations of to-day. Therefore, although the subtle contagious element may be the missing link in this chain of reasoning, nevertheless this theory is a justifiable one in view of our daily observations of psychical disturbances. By thus comparing the two varieties of infection in parallel columns, as it were, we have at least a working hypothesis which can be employed as a basis to demonstrate the reliability of this supposition.

The first thought that would occur to the unbeliever would be whether there was any foundation in fact for this apparently strange hypothesis. In answer I would state that the amount of evidence that could be accumulated in corroboration of this theory would take volumes to catalogue. A moment's consideration of every-day events in the psychical world would furnish the data and material for the solution of this problem. For instance, what we style imitation is only to my mind one variety of psychical infection. It is thought-transference, conscious, voluntary, or compulsory. That is to say, the exact ideas in one person's mind are reproduced in another's with the subject's sanction or through his own efforts, or, on the contrary, without his knowledge or even consent. The degree of this imitative faculty varies in different subjects and at different epochs of life. Infancy and youth are peculiarly susceptible, while old age is slightly disposed to imitation. Experience shows that the mind can be so trained as to be made entirely proof against imitation. Invulnerability seems from experience to be in direct ratio to education, intelligence, and environment. To copy and imitate is a constant weakness of human intellect. The inclination may assert itself in single individuals or in classes and communities. Sometimes it becomes so strong as to resist all efforts of the will. At other times the infection runs riot, causing epidemics of various mental aberrations, such as suicide and insanity and other mental and nervous derangements. Certain seasons of the year and certain epochs seem also to be conducive to epidemics of imitation. To illustrate my meaning, permit me to chronicle a few instances of mental infection through the force of imitation. It is not necessary for this purpose to appeal to ancient history, but simply to revert to current events.

A Western farmer, imbued with an extravagant idea of his own importance, confident that he is the apostle of good government, believing a change in the industrial and labor laws to be necessary, concludes to march on toward the national capital in order to petition Congress for a redress of his own grievances and those of his fellow-citizens. The novelty of the enterprise at once appeals to our lay editors, who see a brilliant opportunity to interest their patrons. Through press notices the news spreads in all directions, so that as the apostle's march progresses recruits and sympathizers are gathered by the way. The infection has spread with lightning rapidity, so that in a few days enough reinforcements have been secured to constitute a good-sized army. Many who cannot join the army lend it their financial support. Thus we have a Coxey's army—a notorious example of mental alienation due to the force of imitation abetted by sympathy.

A small band of religious enthusiasts, believing the world to be infested with enough iniquity and sacrilege to carry its occupants to the verge of despair and to a point beyond all redemption, conclude to come to the community's rescue. In order to make their efforts attractive and the movement picturesque, they resort to cymbals and tambourines, to banners, escutcheons, and uniforms. Their favorite haunt is a street corner, a square, or a country lot. The attraction is sufficiently strong to meet with the approval of many who are religiously inclined. They enlist in the cause. Soon the small band has grown from local proportions to international importance. Thus we have a Salvation Army, another illustration of psychical infection through the force of imitation.

A third and last illustration: A certain type of woman, who, as a result of misfortune or through force of circumstances, has lost the feminine delicacy of her sex, carrying the firm conviction in her mind that her worthy mission can best be attained by approximating man in his dress, manners, and occupations, affects his costume and possibly his inclinations. At once she sets a pace that is followed by many of her own mental build and caliber. The number who imitate her is legion, for the mind of the female is notoriously flexible and impressionable. Thus we have the "New Woman," another recent example of mind-poisoning. Other examples, such as the bicycle or roller-skating crazes, could be mentioned, but why weary the reader?

Besides psychical anomalies there are a few nervous disorders of a functional character that may be acquired by imitation. Thus we are familiar with epidemics of chorea, hysteria, and neurasthenia that have their origin in schools, boarding-houses. and seminaries.

Another interesting variety of psychical infection and one which is at present absorbing the attention of alienist and physician, is hypnosis or suggestion. Here is a comparatively unknown force, power, magnetism, or what not, which we know by its phenomena alone, just as we know matter by its properties alone. Ever since Mesmer at the close of the eighteenth century first announced his celebrated doctrine until to-day, no satisfactory explanation has been offered for this psychological mystery. Numerous attempts have been made by writers of distinction to explain the hypnotic state upon a physiological basis; that is, to attribute this induced state to a disturbed function of the central nervous apparatus. These efforts never survived the tests of time and experience, the consensus of present opinion being that such conclusions were based on mistaken premises and were unacceptable in the light of recent experiences and scientific investigations. Besides this explanation there were others equally original and equally untenable. There were theories galore, so numerous and diverse as to gratify even the most whimsical. None of them, however, was based on the most plausible of all theories, the theory of infection. I know of no better explanation for this strange psychical phenomenon than to call it a mental infection. The grounds for such a belief would be furnished by the evidence based on numerous instances and upon the psychical experiences of the hypnotized. Consider for a moment the nature, the method of procedure, the results, the sequence of events in a given case, and the inevitable logic of it all is that one mind is infecting another, whether for good or for evil, whether with the subject's knowledge and consent or not it matters not; suffice it to say, it is a direct transmission or emanation from an active to a passive agent of a subtle, psychical contagium. Take the familiar instance of a hypnotic *séance*. The *operateur* wills that the receptive subject shall become possessed of certain feelings and emotions, or that he shall perform a definite act. The infection is carried to the subject by a few strokes or passes or through the agency of a brilliant fixed body held in his line of vision. Directly the subject becomes the tool of the operator's will. The psychosis has passed from one to the other without any physical exertion on the part of either, and is known to us only by the expressions in the hypnotized subject. Even the analogy alluded to in the beginning of this article, namely, that which obtains between physical and psychical infection, still holds true, for in place of infected blood, tissues, or organs, we are now dealing with an infection of the will, of the intellect, or of the emotions. While in physical infection the channels for the entrance and transmission of the microbic element is either the blood or the lymphatics, in psychical infection the portal is either the reason or one or more of the special senses.

If this theory of psychical infection should be generally accepted as a reasonable explanation for the hypnotic state, we would be in a position to understand those strange and phenomenal instances of mind controlling and mastering mind which from time to time are chronicled in the columns of the lay press. We could then comprehend how men, especially those neurotic degenerates with plastic minds, can become the willing prey of others to such a degree as to lose their distinct personality and their own idea of self. We could also interpret and account for those cures, apparent or real, from diseases of a hysterical origin which have been wrought at the well-known shrines and during times of religious revivals and which savor of the miraculous to the laity. The bare mention of these facts will serve to recall familiar instances. In like manner this theory of infection could be employed to account on a scientific basis for that psychological complex termed "personal magnetism," examples of which we encounter in our daily experiences. We would likewise come in possession of a scientific explanation for the metaphorical expression, "to poison the mind." It would determine once for all that hypnosis in any or all of its phases is a pathological process depending for its origin on contagium probably specific in character, although unrecognizable by any of the five special senses.

Granted that the psychical processes cited —namely, imitation and suggestion—are types of psychical infection, that is to say, they owe their origin to a mental contagium, it will be apparent at once that this infection must be of unusually frequent occurrence and must assert itself under varying degrees of virulence and intensity. This assertion is in no sense an exaggeration, but is borne out by our daily experiences. Another point of interest and one that again illustrates the parallelism between psychical and physical infection is the perfect immunity enjoyed by some fortunate individuals and the extreme susceptibility to this poison that others exhibit when brought within the pale of its influence. Thus a person of strong will, of forcible character, and of high intellectual power cannot against his will or wish be brought under the hypnotic influence despite the most strenuous efforts at mental coercion. On the other hand, a fickle, impressionable, vacillating mind loses its self-control readily when brought under the influence of a psychical contagion. These are matters of great importance from a medico-legal standpoint, as they enter largely into the consideration of the question of mental responsibility for crime and the question of hypnosis as a defence to the charge of crime. Recent criminal dramas enacted in this city have brought this matter into unusual prominence, and point to the necessity and advisability of consulting an expert in psychology in criminal cases involving psychical phenomena.

I have thus attempted within the narrow scope of a short paper to direct your attention into certain channels of thought with a view of having others follow in the same direction. If I have succeeded I shall feel that I have accomplished all that I intended.—*Med. Rec.*

SUGGESTIONS AS TO OCULAR HYGIENE IN THE SCHOOLS.

By Edward Jackson, A.M., M.D.,

PROFESSOR OF DISEASES OF THE EYE IN THE PHILADELPHIA POLYCLINIC; SURGEON TO WILLS EYE HOSPITAL.

THAT education is properly a drawing out and developing the powers of the individual, enabling him to employ them to the best advantage and with the least expenditure of effort, is generally admitted in theory if ignored in practice. Not specific achievement but increased power to achieve is the chief object of the truly educational process. But this is often forgotten, and most completely forgotten as regards visual power and achievement, which enter so largely into the general plan of education.

Much might be said of the failure to develop by proper training the powers of visual observation as a part of the education, primary in time and in importance; but here I wish to speak simply of the neglect of any teaching of the child how to use its eyes to the least disadvantage in the ordinary tasks of the school-room. Not only is it that children are not taught how to use their eyes to the best advantage, with the avoidance of unnecessary strain; but even in schemes for the improvement of ocular hygiene in the schools it is not recognized that they need such teaching.

Much work has been done with the purpose of helping the eyes of school-children. But a very large part of it has been merely in the direction of demonstrating that many children's eyes have defects of focus and the relative frequency of the different varieties of such defects. It has not been sufficiently borne in mind that whether eyes are perfect or imperfect, whether their defects of focus are corrected or uncorrected, the observance of certain general laws of hygiene and certain special precautions as to the manner of using the eyes will notably increase the extent to which they can be used, and the safety with which they can be used; and will lessen the necessary strain that their use will impose on the general nervous system.

The examinations that have been made and are being made of the eyes of school-children have a positive value. It is well worth while that the acuteness of vision, errors of refraction, and general condition of every child's eyes should be carefully studied before submitting them to the necessary strain of school life. While it may not be proper to compel this by legislative enactment, it is a good thing, to be urged on school authorities and parents and the public upon all proper occasions. But it is not the only thing worth advocating in the direction of improved ocular hygiene in our schools. We need not feel that until we can do it we can do nothing in this direction. If the proper examination of every child's eyes were brought about, something just as important would still remain to be done. And this some other thing we, who in the practice of ophthalmology are most constantly reminded of the dangers of school life to the child's eye, can urge with more evident disinterestedness, and shall find school authorities and parents correspondingly more ready to accept. Then the drawing attention to this phase of the general subject will aid to bring about a better recognition of the other needs of the eye while devoted to school work.

While in the lower grades every child should be taught how to use its eyes to the best advantage and with the least of effort. To any child that can read one can demonstrate the increase of effort from holding the thing looked at too near to the eye, the possibility of recognizing letters held at a proper distance, the impairment of sight by insufficient illumination, or the unpleasant effects of too great or too sudden changes in the amount of light. The essential facts bearing on the methods and arrangements for eye-work can be made clear and reasonable to the child; and they should be so presented early in school life. Then under the supervision of the teacher they should be reduced to practice and enforced until by practice they become habitual.

But, it will be urged, to do this the teachers will first have to be taught. They will have to know something of the principles of ocular physiology and hygiene—matters about which many of them now know little or nothing. One might well hesitate to add anything to the burdens of the overcrammed young woman who now commonly acts as teacher to children of the lower-school grades. But child health (which means race health) and a truer child culture will only be secured under the supervision of those who have some understanding of their essential conditions; and here is a function that takes so large a part in the educational process that it is naturally a point to which attention should be first directed. Then in this case the personal benefit accruing to the teacher from the possession of such knowledge will more than compensate one who makes much use of her eyes for the effort to acquire it. Even if one ignorant of the formulated laws of ocular hygiene has usually unconsciously observed them, a conscious recognition of them will prevent many accidental infractions that would otherwise cause discomfort, pain, or exhaustion, the cause for which would remain unrecognized.

It might, *a priori*, be reasonably supposed that the ability to use the eyes to good advantage, and without injury to those organs or to the general nervous system, would be inherent in the organism or developed during the earliest use of the visual function. Doubtless for the untrained, undisciplined child, the natural feelings of discomfort and weariness would be quite sufficient to overcome its undeveloped power of application, and check ocular effort or turn it into new channels before it became seriously harmful. But the power of application that makes the successful student is the power to follow continuously the one train of thought, or the one series of sense impressions, to the complete disregard of all sensations or ideas that would interrupt it. And among the sensations that are thus habitually disregarded are those of weariness and disinclination to continue the appointed task, that constitute the natural instinctive checks to over-use of the eyes. It is this laboriously acquired power and habit of concentration upon the subject in hand, to the disregard of the instinctive limits of endurance, that makes it necessary to replace these limits of instinct by limits of reason—to use conscious care in fixing the requirements laid upon the eyes, to replace the unconscious guardianship of them by natural sensations and impulses.

The practical point urged for recognition is that the education of the teacher must include a practical working acquaintance with ocular physiology and hygiene—the proper conditions for eye-work as to posture, distance, illumination, hours of work, etc., and a knowledge of what are fair limits of safe requirement. Of course it may be wise or necessary to supplement the teacher's knowledge with expert counsel when this is available; but no amount of consultation or occasional supervision will meet the needs for constant intelligent care and oversight in the arrangement of tasks, the shading of the room at different hours and on different days, or the correction of bad positions of the scholars, as these needs arise.

One other point I wish to bring up, not new but still imperfectly understood, namely, the lighting of the school-room. It ought to be more generally recognized that during school life all eyes are severely taxed. Under the strain a certain portion will break down absolutely, a certain other portion continuing the work will be noticeably and permanently injured, another portion will do the work without noticeable permanent injury but with periods of discomfort and pain, and all would be better off if their required expenditure of vital force for eye-work could be lessened. And it should be remembered that, short of direct sunlight shining on a light or reflecting surface, no illumination of the object looked at can be too strong, but that, with this single exception, the more light the better.

In regard to the matter of illumination much has been said of the ratio of window-space to floor-space, and of a minimum allowable proportion of the former to the latter; and the proper minimum has been variously estimated at from 1.20 up to 1.1. But such a standard has no practical value. It is not to be compared to standards of minimum air-space or minimum water-supply. If a standard is needed it should be based, not on window-space, but on the extent of clear sky always available from the darkest part of the room, at which will be placed a book or other object to be looked at, taken in connection with the angle at which the light from such sky-space can fall upon the book or other object. Mere window-space that does not give access to open sky answers very imperfectly the requirements for illumination; and the angle at which the light strikes the surface to be illuminated is just as important as the extent of sky-space or the intensity of the light.

In any building with large rooms the difficulty is to get window-space high enough to admit light at an effective angle.

In every case the window should extend entirely to the ceiling, and its upper portion should be so arranged as always to be available for purposes of illumination. When the exposure of a window is such that during some part of the school-day the direct sunlight would enter through it, causing light areas on the floor or lower walls and so impairing the practical illumination, its upper part should be set with ground or fluted glass that can intercept these direct rays, and by diffusing them to the darker parts of the room improve the illumination. The size and fitting of the upper part of the window is a point for special attention in securing light for the school-room, but it is not the only point of importance. Indeed, the only safe practical rule to follow with regard to the illumination of a school-building is to so place and plan it as to secure the greatest amount of daylight possible. Until they can be wholly constructed of materials that will freely transmit light, the amount of opaque wall entering into such structures should be reduced to the minimum compatible with stability; and the disposition of the wall should be such as to allow the freest possible ingress of light.

Briefly to recapitulate: It is urged that in the discussions about ocular hygiene in the schools, not enough stress has been laid upon the following points:

The child should be early trained to use its eyes to the best advantage.

The supervision of the work of the school-room, as to the pupils' manner of using their eyes and certain other important requirements of ocular hygiene, should be constant rather than occasional.

In the matter of the illumination of the school-room the proper aim is to secure as much light as possible; and the ratio of window-space to floor-space does not furnish a standard of practical value by which to judge the sufficiency of the illumination secured.

These points have been briefly presented that they might make the smallest claim on the time of those who have given some attention to the subject of ocular hygiene in the school-room; but they are each worthy of more extended presentation, and capable of convincing support.—*Jour. Am. Pub. Health Ass'n.*

OZONE IN SCHOOL-ROOMS.

It is a somewhat remarkable fact that ozone, which can be generated by means of the electric current with comparative economy and cheapness, has not been put to more extensive use for sanitary and prophylactic purposes. Its extraordinary germicidal power has long been known and recognized by the profession.

We recommend the seashore, the forest, and mountain regions to the anæmic and many others whose health is below par, because of the ozone abounding in these localities. In crowded cities ozone is usually absent. Our patients return from their sojourn with increased health and vigor, only to live again in an atmosphere vitiated and more or less detrimental to their well-being.

That it is the duty of the State to conserve the health of its subjects is a commonplace; that, in some instances, this duty, from a prophylactic standpoint, is glaringly neglected and violated is also trite. We need but mention the crowding together, for hours daily, of from thirty to sixty children in a close school-room. Proper ventilation in many of the rooms is out of the question. Opening of the windows admits cold air, only to chill the scholars; opening the doors may disturb the other classes; at best, either way is but poor ventilation. In stuffy, ill-lighted rooms, and in wet weather, with "steaming" clothes, the children breathe and rebreathe the vitiated atmosphere. Soon, as teachers have often remarked, the pupils become inattentive, listless, sleepy, and complain of headaches; as soon as school is dismissed and the open air is reached these symptoms disappear. A glance at the pale faces in a school-room would convince the most sceptical of the vicious results of a lack of proper ventilation. That many children become the victims of disease as the result of the invasion of germs of various infectious and contagious diseases while at school is only too well known. Our health department is continually confronted with this fact, and its efforts are constantly directed toward attempting to remedy the evil. Ozone-laden air contains a minimum number of bacteria; in its absence germ-life flourishes. To the remarkable diminution of ozone in the air during the summer of 1889 Professor Falb was led to attribute the influenza epidemic. Other observers, such as Cook, in Bombay, in 1866; Smallwood, in Canada, and Boeckel, in Strassburg, observed a decrease and even an absence of ozone in the atmosphere during cholera epidemics. Onimus, from observations made in 1883, shows an "absolute and direct relation between the ozonometric conditions and the intensity of the epidemic."

If country air, containing as it does appreciable quantities of ozone, is beneficial to our patients, why not bring a similar condition to bear upon our school-children while herded together in insanitary rooms? If it is the duty of the State to guard the health of its citizens, it is certainly also an imperative and pressing obligation to protect its children from deleterious surroundings in order that they may develop into strong and vigorous subjects. With a knowledge of these facts, why should not the proper authorities have ozone, in sufficient quantity, introduced into the air of the school-rooms? This germ-destroying gas can be easily and readily generated by the electric current. With a dynamo on the premises or a current from the street lines carried into the building, together with the proper apparatus, the school-rooms—nay, the whole building—could be impregnated with this powerfully germicidal agent. This, we believe, could be done with comparative cheapness. Even were the expense just short of prohibitive, the results achieved in improving the health of the scholars and diminishing the communicability of disease would stamp the procedure cheap at any figure. The ozonizing of school-rooms and dwellings has more than once been suggested by the profession.

It is a significant fact that in one of the "babies' wards" of the New York Post-Graduate Hospital, where an ozone-generating apparatus is used, only a few sporadic cases of contagious disease have developed; whereas, in the non-ozonized wards a considerable number, comparatively, of such cases have occurred.

The purification of ozone from noxious by-products is a question of minor chemical detail, and the methods of its introduction into the school-rooms are matters of simple mechanics, neither of which need be dilated upon here. Were it impracticable or excessively expensive to force a current containing ozone into the rooms continuously during school hours, it could be turned on for half an hour or an hour just before the morning and afternoon sessions. This would give the occupants of the rooms a fresh, sweet, clean, and bacteria-free atmosphere to breathe, to say nothing of the pathogenic germs thereby destroyed.—*Am. Med.-Surg. Bulletin.*

AN ANTI-VACCINATION CENTRE SEVERELY AFFLICTED BY SMALL-POX.

THE town of Gloucester, England, and its vicinity have been the scene of much popular excitement on account of an epidemic of small-pox. A riotous demonstration took place at the Cottage Hospital, at Oakridge, used for the treatment of cases of that disease, and arson was committed, the hospital being damaged to the extent of $600. Seven persons were convicted; and each was sentenced to a year's imprisonment.

In February last the assizes for the winter term should normally have been held at Gloucester, and Justice Grantham attended at that town for this purpose, but such was not carried out. In his charge to the grand jury he stated that he had received a communication from the authorities in Gloucester to the effect that small-pox was prevalent in the city and had been so for some little time past. Although every step had been taken to prevent any spread of the disease he had been asked to authorize an order to be issued closing all the public galleries in the court, so that no one should be allowed to attend the assizes save those on business. This he deemed was a very serious thing to do, and the question occurred to him, whether he was justified in bringing together into a town where disease was prevalent persons from all parts of the country, of all ages and both sexes, and in all states of health. The judge, therefore, took steps the result of which was that the assizes were ordered to be removed to Cheltenham. Since, however, this decision has been arrived at the judge observed that he was informed that in Gloucester there were many people who, for the sake of a better name, called themselves anti-vaccinationists—that was, they resented the opinion that generally prevailed in the country, and by persons in authority, that all children should be vaccinated. When, therefore, he heard that the local authorities refused to compel persons to have their children vaccinated he thought it was more desirable than ever to take the step which had been taken because there were in the town many people—children and adults—who had not been vaccinated. It may be after this that the authorities will take these remarks of the judge into serious consideration.

The following paragraph in the *New York Times* comments upon the effects of the anti-vaccination craze upon the afflicted town:

"Anti-vaccinationists in this country may well ponder on the experience through which the citizens of Gloucester, England, are now going. For years that city has been a centre of the anti-vaccination craze, and so prevalent there was this particular form of idiocy that the law in regard to the employment of this safest and most certain of all the prophylactics known to medical science has long been a dead letter. The local authorities refused to enforce it, and as a result not only has a vast proportion of adults gone without any other protection than luck from the attacks of a loathsome and fatal disease, but a whole generation of helpless children was allowed to grow up unguarded, and every school became simply an invitation to pestilence. Now the invitation has been accepted, and such an epidemic of small-pox is raging at Gloucester as has been rarely equalled in modern times, except among the savage tribes of Africa or Greenland. It was only a few weeks ago that the first case was reported, and already the infection has swept through the whole city. The hospitals are crowded to overflowing, business is at a complete standstill, churches and schools are closed, and toward the cemeteries moves an almost continuous procession of wagons laden with the dead. And yet, in circumstances like these, the anti-vaccinationists of Gloucester are as vehement as ever in defence and propagation of their doctrines. They hold nightly meetings, and as all the local papers except one refuse to print their imbecile arguments, they are placarding the town with hideous and puerile pictures of Death, using his dart as a lancet and vaccinating a child who struggles in the grasp of a policeman."

An item in one of the English journals, also, states that an isolation hospital will presently be built for the use of Gloucester, in five pavilions, at a cost of nearly $50,000, inclusive of $10,000 to be spent for extra roads, water-supply, sewering and disinfection plant. The experience of the town, which is not a large one, has been costly and humiliating.—*The Journal.*

ANOTHER ULTIMATUM FROM THE SUPERINTENDENT OF STREET-CLEANING.

UNDER Federal ruling, on the 1st of April it was forbidden to dispose of garbage by dumping it into the waters of the Lower Bay. It was expected that by that date the superintendent of street-cleaning would have devised obvious methods of disposing of the city refuse after a more civilized fashion. The 1st of April dawned and passed and the old methods were still in force; and then the community became aware that possibly only a joke fitted to the season had been perpetrated by the change advertised so extensively for months in advance. It seems that there is one department, at least, in this city which is a bigger man than the Federal Government, unless we are to take in all seriousness the newest ultimatum emanating from the expert who presides over this department.

Thus we note that after the new contract for the disposal of the city's garbage goes into effect—when this shall finally be is not stated—garbage will be kept separate from ashes and be collected in separate carts. Similar rules were formulated a year ago; and yet, while the citizens have bought separate receptacles and scrupulously placed ashes in the one and garbage in the other, the same cart collects them. What in the world is the use of issuing manifestoes which the citizens obey and the employees of the Street-cleaning Department disobey?

The day has passed when this community is going to rest satisfied with bombastic utterances and orders. We await facts, and desire less talk and more action. Action of the proper caliber will consist in causing department foremen to see that the collectors perform their duty after the fashion demanded by sanitation and common sense; and in the line of both is not alone the separate collection of ashes and of garbage, but the carting away of each in closed carts, thus avoiding that which is necessarily of constant occurrence — the disposition of ashes and litter of every imaginable sort in the streets, possibly immediately after these have been properly cleaned. How slow these officials seem to be to see as others do—even the rawest recruit to our population—and to adopt methods which will tend to keep our streets clean, because one method of rendering them filthy will have been done away with, and which by the adoption of the simple process of the incineration of garbage will cease ruining the beaches adjacent to this city.

What is the use of a manifesto which carries a clause to the effect that refuse, other than ashes and garbage, shall be stored in the house or in the back-yard until called for, when any one at all familiar with the necessities of our vast population knows that the majority have no room to spare within their living quarters to store refuse in, and that only the favored few can boast of a back-yard? Then, again, in case it were feasible for the majority of those who live in this city to dispose of this refuse until called for, to judge from the record of the past, many a day may elapse before it is called for.

In short, with the best intentions in the world, and having been favored with higher educational facilities than characterize the average city employee, the present commissioner of street-cleaning is too slow in action of a sensible type, and is not doing credit to the vast fund of practical knowledge which he undoubtedly possesses. Possibly, now that the mayor has disposed of that rather weighty matter—the Consolidation Bill—he will direct his attention to his appointee, and make him do quick and strict, sensible duty or find some one else of the same scientific knowledge, but the possessor of more vim, especially as the heated term is all but upon us, and we have made no progress along common-sense lines in this important department.—*Amer. Med.-Surg. Bulletin.*

MEDICAL EMPLOYEES OF BOARDS OF HEALTH AND THE PROFESSION.

In another column the *Bulletin* prints a letter from a subscriber the tenor of which reveals a lack of appreciation on the part of employees of the Board of Health of the limitations of their duties. Under the law professional men are obliged to report to the Board of Health the presence of diseases of an infectious nature occurring in their practice. This duty is cheerfully conformed with, since it is recognized as requisite in order to enable statistical data to be properly kept, and also because it is important that contagion should be prevented and the spread of epidemics be avoided. This duty, furthermore, the professional man performs without remuneration, considering that it is something which he as a citizen owes to the commonwealth.

Boards of health in recent times have, in every possible way, endeavored to devise means for making the matter of reports as little a tax as possible on the time of the busy practitioner. Neither the law, however, nor the dictum of any board of health justifies its employees figuring in the rôle of either attending physician or consultant. The strict limitation of the duties of the inspector is to certify that there exists a case of contagious disease in the household whence the report emanated, and this is all. If he should find that the diagnosis is an erroneous one, it is not within his province to so state to the family or the patient, thus inevitably casting disrepute on the diagnostic ability of this professional brother. Nor is it within his province to prescribe for the case or to give any opinion as to whether or not the patient has outlived the contagious stage of the disease. Least of all is he required to discharge a case of scarlet fever in the absence of the attending physician, as occurred in the instance brought to our knowledge.

Such an act constitutes the grossest possible breach of ethics—the overstepping of duty to a degree which calls for prompt reprimand from superior officers, if not for dismissal from the service of the department. What does the inspector from the Health Department know about the phases of the disease in the individual case, except possibly that the time when contagion is usually effective has been passed? Suppose, in case of scarlet fever, for example, that there exists a kidney complication which, in the opinion of the attending physician, calls for great circumspection in regard to the time when the patient should be allowed to leave his bed. Can it for a minute be claimed that it is the duty of the inspector from the Health Department to decide the question in the absence or even in the presence of the attending physician? Inspectors from the Board of Health can neither figure as attending nor as consulting physicians unless so requested to act by the physician in charge. In the event of the meddlesomeness of an inspector leading to serious complication we question if the Board of Health, since in the eye of the law it is held responsible for the act of its agents, does not lay itself open to suit for damages.

We believe that the facts in the case referred to, if they are stated to the officials of the Board of Health, will result in the discipline of the offending employee. We only dwell thus at length on the question at all because, at times, equally flagrant instances have been reported of meddlesomeness and officiousness of the same character. We sincerely trust that the duties of employees will be so clearly defined that in the future there shall be no cause for complaint against a department of our city government which in many respects is attending to its duties after a satisfactory fashion.—*Amer. Med.-Surg. Bulletin.*

FOOD AND INDIGESTION.

We have as many kinds of dyspepsia as there are kinds of food to be digested. Thus a person may have starchy or salivary indigestion, proteid or peptic, fatty or intestinal; but rarely, if ever, are all these forms found to begin in the same individual at the same time. A person can usually tell which of the forms mentioned he suffers from. Let him eat only one kind of food at a time until he has ascertained which it is that disagrees with him; then by avoiding that food, whether it be starches, meats, or fats, he can give that part of the digestive apparatus concerned in its digestion the needful rest. Under this favorable condition the digestive function soon resumes its normal activity. But prevention is better than cure, and I venture to offer some practical suggestions:

One of the most fruitful causes of starch-indigestion is insufficient mastication and insalivation; the efficiency of after-digestion depends largely upon the thoroughness with which the food is chewed and mixed with saliva; no amount of pepsin taken as a medicine will compensate for the lack of this.

Fresh bread or any food which is apt to form into a doughy or gluey mass is impervious to the digestive juices, and should be avoided.

The diastase of the saliva is incapable of changing starch to sugar if either the starch is uncooked or the saliva not alkaline; breakfast foods and other starchy cereals, therefore, should be well cooked, and vinegar pickles should be sparingly used, or salivary digestion will be impaired.

The thinner the gastric juice the more rapid and efficient will be the digestion of meats and other proteins. The presence of digested food in the stomach hinders the action of the gastric juice on the undigested portion; digested food should therefore be removed as quickly as possible, and nothing accomplishes this so well as water. Hence it is good to drink plenty of water with each meal; don't wash down the food with it, but swallow the food, and then drink as much water as you like.

As to which foods are wholesome and which are not, no hard and fast lines can be drawn. Healthy individuals differ widely in their ability to digest what are in general wholesome foods. Thus, milk is very readily and completely digested by some, while serious disturbance of the digestive system follows its use by others. Avoid, then, food which common experience teaches is unwholesome, and of the wholesome foods eat only those that agree with you. Foods which have a savory odor and pleasant flavor make our mouths water, *i.e.*, excite the flow of the digestive juices, and on that account are believed to be more easily digested. As to the quantity of food taken, we should expect that the stomach, being a muscular organ, would need moderate exercise, and the findings are in accordance with our expectations, for experiments have shown that a moderately full stomach digests its contents more completely than either a distended stomach or one in which there is little food. A varied diet is digested better than a monotonous one. Where there is no variety the food is apt to become repugnant, and the digestive functions, as a result, are disturbed. A great variety at any one time, however, is more difficult of digestion than a simpler meal.

Very moderate exercise just after eating is probably not prejudicial to digestion. Violent exercise or fatigue certainly is. In violent exercise the blood is drawn away from the stomach, and as a result too little gastric juice is secreted, the gastric glands secreting actively only when well supplied with blood. Similarly, and for the same reason, active mental effort is not conducive to good digestion. During sleep digestion is not very active. The older physiologies used to tell us to avoid eating anything within at least three hours of bedtime. Experience teaches, I think, that a person going to bed with a moderately full stomach will sleep better than if the stomach be empty. If you need the food, take it. Cheerfulness has long been considered a very efficient aid to digestion. "Cheerfulness and health react on each other" and "Food well chatted is half digested" are sayings which contain more than a little truth.—*Thomas Grant Allen in The Chautauquan.*

A LEAN PEOPLE.

AMERICANS are proverbially a dyspeptic race, with a few exceptions now and then among city aldermen, plethoric judges, and doctors who do a consulting practice, the total number of whom is not sufficient, however, to bring the average up to the normal standard. Leanness is due to the inability to digest and assimilate fat-making food. The non-digestion of starch is unquestionably one of the most common causes of disordered digestion. This is doubtless the chief cause of the extensive use of beef and other forms of flesh food in this country. Meat is readily dissolved in the stomach, and its digestion is not accompanied by the flatulence, acidity, and other distressing symptoms present in amylaceous dyspepsia. A beef diet is the most ready means of obtaining relief from these annoying symptoms, and hence is one of the most common diet prescriptions made by physicians, and one which is perhaps more frequently than any other made use of by patients for themselves. The result is relief from a certain set of symptoms, but at the same time the development of others which, if less disagreeable, are in the end not less serious. An exclusive meat diet robs the system of its proper supply of fat, and overwhelms the body with a great quantity of ptomains, leucomains, and tissue-poisons, which decrease the resistance of the body to disease.

Bouchard, Rogers, and others have shown that the poison-destroying function of the liver depends upon the amount of glycogen which it contains. This is almost exclusively derived from the starch of farinaceous foods; hence a person who, in consequence of inability to digest starch, confines himself largely to a meat diet, is exposed to a double injury—the introduction of toxic substances into the system and the lessened ability to destroy toxins and ptomains.

The dyspeptic who is suffering from the inability to digest starch, in exchanging a farinaceous for a flesh diet simply exchanges one class of morbid conditions for another, the biliousness or general toxæmia, the uric acid diathesis, and the resulting rheumatism, neurasthenia, and allied conditions which proceed from a meat diet being far more serious in their ultimate effects than the acidity, flatulence, and other annoying symptoms experienced from the indigestion of starch. The fermentation of proteids in the stomach, intestines, and colon, which always accompanies a flesh diet, produces toxic substances of a peculiar character, while the fermentation of starch results in the formation of acids and gases which are annoying and irritating, but not to any degree toxic. A certain amount of fat in the tissues is necessary as an aid to vital resistance. The excessively lean as well as the overfat person is more liable to attacks of disease than the person who possesses a normal amount of adipose tissue. Starved pigeons can be readily infected with certain microbial maladies against which they are found to be proof when well fed.

The substitution of a meat diet for one consisting of farinaceous foods, while a convenient mode of dissipating certain unpleasant symptoms, is, nevertheless, not the best remedy for this condition. What the patient requires is not the withdrawal of starchy foods, but the ability to digest them. —*Mod. Med.*

Department of Physiological Chemistry.

WITH SPECIAL REFERENCE TO DIETETICS AND NUTRITION IN GENERAL.

Edited by R. H. CHITTENDEN, PH.D.,

Professor of Physiological Chemistry in Yale University.

SOME CHARACTERISTICS OF COW'S MILK.

THE inner relationship of the several constituents of cow's milk has always been, and is now, unsettled. This is particularly true of the proteid constituents, viz., of the casein and lactalbumin. That the former is a paranucleoalbumin and the latter a body closely related to serum-albumin there can be no question, but as to the way in which these bodies, especially the former, exist in fresh cow's milk there is considerable uncertainty. There is much to indicate a more or less close chemical union between the casein and the calcium phosphate of the milk-serum; a union which probably is responsible in part for many of the peculiarities characteristic of this body. The action of soluble lime salts in determining the coagulation of casein by rennet well illustrates how potent these inorganic substances may be in controlling the reactions of this peculiar proteid body. Pure casein entirely free from calcium salts is not coagulated by the rennet-enzyme, although the latter may apparently induce a cleavage of the proteid into a paracasein-like body, precipitation of which, however, does not occur until a calcium salt is added.

Change in the equilibrium of the several constituents of cow's milk is easily induced by simply boiling the fluid. Heat so applied may readily induce a change in the character of the proteid matters present, but it may also result in a readjustment of the relationship existing between the proteids, inorganic salts, and the other constituents of the milk. That milk so treated differs from fresh milk in its taste, in the behavior of the casein, in its digestibility, in its value as a nutrient, etc., has long been known, but recently there has been reported the results of an exact study of the influence of boiling upon the proteids of milk ;* results which may well be considered in their bearing on the value of this common treatment of milk destined for dietetic purposes.

Dr. de Jager finds that simply boiling milk for a short time, and then rapidly cooling it, produces alteration, as might be expected, in the relative proportion of casein and albumin. Thus, in a milk containing 3.75 per cent. of total proteids, the proportion of casein and albumin before and after boiling was as follows :

	Raw milk.	Boiled milk.
Casein.	3.15 per cent.	3.50 per cent.
Albumin.....	0.60 " "	0.25 " "

Corresponding to this result it was found that the coagulum produced by rennet in the raw milk amounted to only 2.8 per cent., while in the boiled milk it amounted to 3.1 per cent. Undoubtedly, boiling transforms a certain amount of the lactalbumin into albuminate which is not coagulable by rennet, or it may be that the albumin is partially coagulated, or again there may be formed a combination between the casein and the albumin. de Jager inclines to the view that aside from casein there are two distinct proteids in milk, viz., an albumin and a globuiin, and that by boiling, the former is transformed into casein while the latter remains in solution. Thus, if raw milk is saturated with magnesium sulphate, the filtrate contains albumin, while in cooked milk the magnesium sulphate precipitate contains all of the proteid matter. The proportion of the three milk proteids in fresh milk is stated as follows:

---

* Dr. L. de Jager: Ueber den Einfluss des kochens auf die Eiweissstoffe der Kuhmilch, *Centralbl. f. d. med. Wissensch.*, 1896, No. 9.

Casein....................	3.15 per cent.
Albumin.................	0.35 " "
Globulin.................	0.25 " "

Sterilized milk yields a somewhat different coagulum with rennet than raw milk. Thus, raw milk as is well known is inclined to give a tough, curdy coagulum with the ferment, while in sterilized or boiled milk a small amount of the enzyme causes a flocculent precipitate, a larger amount of the ferment producing a more or less gelatinous coagulum easily broken apart. Further, the coagulum from boiled milk is easily soluble in dilute solution of sodium hydroxide, in lime-water, and in solutions of sodium phosphate. It is also able to hold large amounts of calcium phosphate in solution.

Especially noteworthy is the behavior of the two kinds of milk towards artificial gastric juice. In studying this question it is to be remembered that when milk is precipitated with the rennet-ferment, as on the addition of an ordinary solution of pepsin, the casein is thrown down in an altered form quite different from the precipitate produced by addition of acid. These two precipitates behave quite differently toward pepsin-acid. Thus, in raw milk the cheesy precipitate thrown down by the rennet-ferment shows a different degree of digestibility than the casein precipitated by acid. de Jager reports the following results obtained with raw milk, the casein being precipitated in one case with rennet prior to its digestion, and in the second case with acid alone. The rate of digestion was as follows:

	1 hr. Per ct.	2 hrs. Per ct.	3 hrs. Per ct.	4 hrs. Per ct.
1. Cheesy precipitate digested.	40.4	48	53	54.5
2. Casein precipitate digested.	35.3	51	53	58.6

With boiled milk the following results were obtained:

	1 hr. Per ct.	2 hrs. Per ct.	3 hrs. Per ct.	4 hrs. Per ct.
1. Cheesy precipitate digested.	34	42.6	42.9	46.8
2. Casein precipitate digested.	33.7	46.6	49.4	53.6

From these figures it would appear that the digestibility of the proteids of milk is diminished by boiling. Further, that casein is more easily digestible in gastric juice than the cheesy precipitate produced by rennet. Obviously, however, the physical condition of the casein curd will have a very great modifying influence upon its digestibility. If finely divided it will dissolve far more readily than when in a compact mass, and the ease or difficulty with which the curd may be broken apart will exercise a very great influence upon its digestibility. The condition of the stomach, however, into which the milk is received, will necessarily be an important factor in determining the condition of the casein coagulum. If the contents are strongly acid, especially with free or combined hydrochloric acid, the casein may be precipitated practically unaltered before the rennet ferment is enabled to act. In such a case, as in a healthy infant, the gastric juice will be called upon to dissolve the more easily digested casein flocks, and there will be little or no curdy precipitate to impede digestion. When, however, the conditions plainly indicate that the digested milk, boiled or unboiled, is undergoing coagulation with formation of curdy masses more or less irritating to the sensitive stomach, then there would seem to be a call to so modify the milk that the casein shall be precipitated in fine flocks, more or less akin to the form in which it is inclined to separate from mother's milk. Such a procedure would certainly tend to render the cow's milk more closely akin to human milk, and in infant feeding, especially where there is disturbance of the gastro-intestinal tract, a close approximation of the infant's food to the infant's natural supply, both in chemical composition and in the physical properties of the several constituents, is greatly to be desired.

THE RELATION OF THE LIVER TO FAT.

THE great bulk of the liver, its large and peculiar blood-supply, the character of the hepatic cells, and the large content of various extractives, all testify to the importance of this gland in the metabolism of the body. As to its relationship to the normal formation of fat there has always been much doubt, although many things have pointed to a connection between the liver and fat metabolism. Dr. Noël Paton, of Edinburgh, however, has of late been studying this question, and he has recently reported a large number of interesting results in the *Journal of Physiology*,* some of which are very suggestive and full of physiological importance. We therefore present to our readers extracts from Dr. Paton's paper, feeling sure that many of the statements made will be helpful in throwing light upon some of the complex problems of nutrition.

"Since Bernard, in 1855, showed that the liver, in its sugar-producing function, is connected with the general metabolism of the body, the view of the older physiologists that the organ is simply a bile-forming gland has steadily lost ground. Subsequent researches have confirmed and extended the conclusion of Bernard, and at present the liver must be regarded rather as the great regulator of the supply of carbohydrates and of proteid material to the body generally than as a digestive gland. The liver is on the direct channel of absorption of carbohydrates and proteids, but it is not on the route of the absorption of fats. These, as shown by Munk,† are all absorbed by the lymphatics and reach the liver only through the hepatic artery. Has the liver, then, any special connection with the metabolism of fats?

"Such a connection is suggested by the enormous accumulation of fat in the liver of such animals as the cod at certain seasons, and of cats and other animals in certain conditions not pathological. But so far no systematic investigation of the question has been made. Nasse,* in a lecture to the Rostock Naturalists' Society, suggests the probable connection of the liver with fat metabolism. He points out that Hofmann found an excess of free fatty acids in the liver, and compares its condition in this respect to the condition of sprouting seeds where the same high proportion of free fatty acids exists. For this metabolism there must be a transport of fat to the liver from the body, but Nasse is constrained to admit 'such a transport of fat to the liver, and, indeed, an accumulation of fat in the liver in such cases (infiltration) has as yet of course only once been proved by figures, namely, in phosphorus poisoning.' C. Voit, having pointed out the clear evidence there exists of the formation of fat from carbohydrates, says: 'The question of whether this formation of fat from carbohydrates occurs in all organs or in a special organ—for example, the liver—must remain for further research to discover.' Langley gives a series of observations on the amount and distribution of fat in the liver of frogs under different conditions, which strongly supports the view that fat is metabolized in the liver whenever the general metabolism is active. Thus, fat accumulated during the cold months disappears during the summer. Winter frogs exposed to a high temperature show a decrease of fat in the liver, the individual globules becoming smaller and disappearing. Immediately after the taking of food the hepatic fat decreases, to be later increased in amount, and later still to again fall to the normal. His observations were entirely histological. Such speculations and observations, suggestive as they may be, are of little value without a more extended experimental basis."

With regard to the general character of the fatty matter normally present in the liver Paton finds that the larger proportion is readily soluble in ether, but it is to be noted that after extraction of the tissue with ether, the action of a mineral acid liberates a further amount of material soluble in ether (fatty acids) which is in part derived from soaps and in part from such compounds as nucleins and lecithin albumins. The ether-soluble fat appears to be evenly distributed through the liver, the percentage amount in one lobe being practically identical with the amount in the other. It was further found that in animals in the same condition the percentage amount of ether-soluble fat is fairly uniform; a result which is in striking contrast with the distribution of the hepatic glycogen, it being extremely difficult to secure anything like the same percentage of glycogen in any two livers, even though the animals are kept on the same diet.

---

* On the Relationship of the Liver to Fats. By D. Noël Paton, M.D., B.Sc., F.R.C.P. (Edin.), Superintendent of the Research Laboratory of the Royal College of Physicians of Edinburgh. (*Journal of Physiology*, vol. 19, p. 167.)

† *Virchow's Archiv*, Band 123, p. 230 and p. 484.

* *Biol. Centralbl*, Band 6, p. 235.

The amount of ether-soluble fat in the livers of different animals under different conditions of feeding, etc., appears to range from 3.0 to 18.3 per cent. of the moist tissue, or from 13.7 to 47.6 per cent. of the dry solid matter.

"The essential part of a fat, not only from the chemical but also from the physiological standpoint, is the fatty acid. Munk has demonstrated that a given weight of fatty acid is of equal value, as a source of energy in the body, with the corresponding amount of its glycerin fat. It is therefore the amount of fatty acid which must be taken as a measure of the amount of fat in the organ. It was thus necessary to determine what proportion of the ether extract is formed of fatty acids. The following table shows the average percentage of fatty acids in the ether extract of the liver of various animals :

Animal.	No. of observations.	Per cent. fatty acids.
Kitten,	19	55.5
Cat,	3	53.1
Rabbit,	31	57.8
Rat,	6	54.6
Sheep,	1	66.2
Pigeon,	3	61.3
Skate,	1	65.9
Ling,	1	69.1

"These results clearly show that the ether extract of the liver gives a most imperfect indication of the amount of the essential constituents of the fats—the fatty acids. While the ether extract of the subcutaneous and other adipose tissues is almost entirely composed of neutral fats containing 90 to 94 per cent. of fatty acids, the etner extract of the liver contains from 40 to 90 per cent., indicating that other compounds besides the normal fats must be present." Further, the fatty acids of the liver fat are characterized by their comparatively high melting-point, a fact which may be taken as an indication that the fats of the liver contain a much smaller proportion of oleic acid than the fats of the other parts of the body. "This may be due to one of two different causes. Either the oleic acid being less saturated is more rapidly metabolized in the liver, or the proportion of the acids may depend upon the temperature of the tissue, being such as to insure that at that temperature the fat shall be fluid. This latter view seems to be supported by the varying melting-point of the subcutaneous fat in different animals. In the porpoise living in a medium of low temperature and with a low peripheral temperature the subcutaneous fats are especially rich in oleic acid."

"In ordinary adipose tissue the fatty acids are almost entirely combined with glycerol as neutral fat. But it has already been shown that in the liver other compounds occur. Of these undoubtedly the most important is lecithin—a compound in which phosphoric acid linked to cholin replaces one of the molecules of the fatty acid radicle in a neutral fat. This compound yields about 54 per cent. of fatty acids as stearic acid, 15 per cent. of cholin, and 12 per cent. of phosphoric acid. The following table gives the amount of lecithin in the liver of various animals in different conditions :

LECITHIN IN LIVER.

Per cent. of Liver.	Per cent. of solids of Liver.	Per cent. of ether extract of Liver.	Animal.	Remarks.
2.60	11.4	56.1	Rabbit	Fed on bran and oats.
1.90	—	36.4	Cat	" " "
2.05	—	51.3	Rabbit	Fed on bran and green food.
2.57	9.1	50.0	Kitten	Fed on bread and milk.
3.04	10.3	60.0	"	48 hrs. hunger.
3.31	11.7	70.0	"	59 hrs. hunger.
1.72	5.2	11.0	"	24 hrs. after cream.
1.42	9.8	3.5	"	Fed for week on cream.
2.24	8.9	34.2	Rabbit	Fed on turnips; very fat.

"These results . . . show that lecithin is a constant constituent of the liver, and that its amount is fairly constant, averaging 2.35 per cent. of the liver and 9.7 per cent. of the solids of the organ. On the other hand, the proportion of lecithin in the ether extract varies greatly, being largest during starvation and smallest in a fatty diet. In normal states of nutrition the amount of lecithin bears a fairly fixed proportion to the total amount of fatty acids, *i.e.*, a fairly fixed proportion, about one-half, of these fatty acids is combined in lecithin.

Lecithin. Per cent.	Fatty acids. Per cent.	Fatty acid Lecithin. Per cent.	Remarks.
2.60	2.82	1.08	Rabbit.
2.05	2.45	1.14	"
1.90	3.20	1.67	Cat.
2.57	2.75	1.06	Kitten.
1.72	10.60	6.10	Kitten fed on fat.
1.42	36.80	28.30	" " "

When fat rapidly accumulates in the liver the proportion of lecithin sinks.

"These results are opposed to the view expressed by Lebedeff, that on a proteid diet the fatty acids are entirely contained in lecithin compounds. Nor do they support the opinion of Heffter that in starvation the lecithin diminishes. His experiments certainly do not seem to justify this conclusion. There can be no doubt that lecithin is present even when the liver cells under the microscope show no trace of fat globules. While lecithin is not soluble in water, it is, nevertheless, acted on by water much more markedly than fats, and undoubtedly a large amount of the lecithin must be held in solution or suspended in the paraplasm or in the protoplasm of the cells. The researches of Liebemann* strongly support the view of the existence of a chemical compound with the proteids or nucleins of the cell. How close this connection may be it is difficult to decide, but the fact that from nuclein purified in the usual way both fatty acids and phosphoric acid may be obtained by treatment with NaOH and HCl, and subsequent extraction with ether, would seem to indicate that lecithin or some lecithin-yielding compound is intimately linked with the nuclein.

"That lecithin, or the phosphorus of lecithin, is of use in the formation of the nucleins of the body is shown by the development of these from the yolk of the egg in birds and other oviparous animals. The value of fats in the treatment of rickets seems still further to connect them with the utilization of phosphorus. The large and constant amount of lecithin in the liver and the power which the organ possesses to store or manufacture fatty acids seem to point to its having the power of synthesizing these with phosphoric acid and cholin into the lecithin molecule as a first stage to the utilization of the former in the construction of nucleins. The evidence of such synthetic processes occurring in the liver is now quite satisfactory both as regards glycogen and urea. As to the source of the phosphorus, it is highly probable that this is yielded by retrogressive metabolism of the nucleins, and that just as the liver has the power of retaining iron to be again built into the hæmoglobin molecule so it can also retain the phosphorus for the construction of lecithin. But it is also possible that the phosphorus absorbed as salts of phosphoric acid in the food may in the liver go to the production of lecithin. The liver would thus seem to have this important function of utilizing and economizing the phosphorus of the body by combining it with fatty acids to form lecithin as a stage in its conversion into the nuclein compounds of the body. This conception of the nature of hepatic lecithin opens out a number of distinct lines of investigation, among the most important of which is the amount of lecithin in the fœtal liver."

What now is the influence of food upon the fats and fatty acids of the liver? "During starvation the liver, like other organs, loses weight. The glycogen rapidly disappears, but the metabolic changes are continued, as is shown by the constant production of glucose, of urea, and of the various bile constituents. That the activity of metabolism is diminished is shown by the lower temperature of the blood leaving the organ, and by the diminished manufacture of the various products of the liver. This diminution in the hepatic metabolism in starvation is further demonstrated by the experiment of v. Schroeder and the more recent observations of Schöndorff* on urea production. Does this diminution in the metabolism lead to an increased accumulation of the liver fats, or do the needs of the organism produce a withdrawal of fats from the liver?"

---

* *Pflüger's Archiv f. Physiol.*, Band 54, p. 573. Also *Centralbl. f. d. med. Wissensch.*, 1893, No. 28.

Experiments tried on kittens and pigeons gave results indicating "that even in a fast extending over four days the normal amount of fats in the liver is not altered. But whether this indicates a non-metabolism of the fats, or whether it shows a correlated decreased accumulation and metabolism, maintaining the normal amount, is not demonstrated. It is at least certain that there is no such disappearance of fat as of glycogen from the liver in starvation. Either by diminished metabolism, or by transport from without, or by the production within the organ, the liver maintains a store of fatty acids during inanition.

"Probably one object of this is to afford the necessary material for combination with phosphorus as lecithin. During starvation the nucleins must undergo katabolic changes, and for the maintenance of the life of the cells they must be renewed. For this purpose the waste phosphorus must be retained, and to retain it a supply of fatty acids seems necessary. In starvation the energy of the body has to be yielded not only by the muscle, comparatively poor in nucleins, but by the metabolism of the constituents of the body (liver, spleen, etc.), which are richer in these substances. It is probably for this reason that the excretion of phosphorus does not fall proportionately to the excretion of nitrogen and that thus the quotient in the excretion increases. But just as the nitrogen is economized in starvation so is the phosphorus. During the first few days of the fast in Succi's case the excretion of phosphorus was about 0.9 gram, while after 11 days it fell to about 0.4 gram. That the alteration in the quotient indicates merely an increased metabolism of the bones I do not think has been definitely proved. What the source of the fatty acids is in starvation has not so far been established. That they may be derived from the fats of the body seems to be indicated by the phenomena of phosphorus poisoning, and by the action of phloridzin on the starving animal. Whether they are also derived from the sugar, which is certainly formed in the liver from proteids during starvation, has not been determined."

Paton next considers the influence of food upon the fat of the liver. In this connection, as already stated, it is to be remembered that while the liver is upon the direct path of absorption of proteids and carbohydrates, it is entirely off the path of the absorption of fats. The latter are without question almost entirely absorbed by the lymphatics of the intestine. This fact, however, does not necessarily prevent the hepatic cells acting as a storage place for the fats absorbed. Indeed, Paton finds by experiments on animals that "an excess of fat taken in the food is largely stored in the liver cells, from which it is gradually got rid of, but only after about 70 hours." This power of accumulating fat in the liver without doubt varies greatly in different animals.

"The relationship of the carbohydrate of the food to the formation of fats in the liver is of very special interest. It has been clearly demonstrated that in the animal body carbohydrates are a source of fat. It is also well known that the liver has the power of arresting and storing carbohydrates as glycogen. That this glycogen is in part at least converted to glucose, and in this form sent to the tissues, has been demonstrated beyond doubt by various observers. But the possibility that glycogen is also a source of fat in the liver has to be considered. It has been suggested that the carbohydrates of the liver may be converted to fat and in this form sent to the organism. The theory is without experimental basis, and so far no evidence of the formation in the liver of fats from carbohydrates has been adduced, though Voit, as already stated, has suggested that in the liver such a transformation may occur. The fact that the food used in bringing about the accumulation of fat in the liver of Strassburg geese is largely maize, which is chiefly composed of carbohydrates, favors this view. The formation of fats from carbohydrates is, according to Gautier, indicated by the greatly increased excretion of carbon dioxide without an increase in the oxygen taken up after the administration of carbohydrates. According to Gautier the reaction may be represented as follows:

---

* *Pflüger's Archiv f. Physiol.*, Band 54, 1893.

$$13C_6H_{12}O_6 = C_{55}H_{104}O_6 + 23CO_2 + 26H_2O$$

"Although not believing that a process so complex as the conversion of the carbohydrate to the fatty molecule can occur in this simple manner, the observations of Richet and Hanriot undoubtedly favor the view that in the metabolism of the animal body carbohydrates are converted to fats with considerable rapidity. The statement is generally made on the authority of Hoppe-Seyler that the liver fats increase after each digestion, and thus, to a certain extent, run parallel with the liver glycogen."

This statement immediately raises the question whether there really is any direct relationship between the amount of fat in the liver and the amount of glycogen? Experiments made by Paton "clearly show that there is no truth in the statement that the amount of fat and glycogen in the liver in any way correspond to each other." This fact, however, has no bearing on the question as to whether fats are formed from carbohydrates in the liver. Feeding animals on a diet rich in carbohydrate and then determining the fat of the liver gives results which seem to indicate that a carbohydrate diet causes an increase in the liver fats. "But such observations are not well calculated to elucidate the question of whether fats are formed from carbohydrates. It is known that carbohydrates are in the first instance stored in the liver as glycogen. If fats are formed from carbohydrates they must be produced from the hepatic glycogen, and therefore any increase in the hepatic fat due to changes in the carbohydrates should make itself manifest at the period when hepatic glycogen is disappearing. Prausnitz has shown that in hens, at least, the glycogen accumulates during the 12 or 24 hours following a meal, and then steadily diminishes till, at the end of 48 hours, it has reached a very small amount. That the disappearance occurs in about the same time in rabbits has been for long known. Two days' starvation leaves the liver nearly free of glycogen. Does an increase of fats occur as the glycogen disappears?"

Experiments tried by Paton on rabbits "show a marked increase in the fatty acids in the liver at the period when the glycogen is disappearing. That it is an actual increase is shown by the fact that there is an actual increase of fats in relationship to the solids deprived of glycogen and fats. Is this increase due to an increased formation of fat from glycogen in the liver, or is it due to a transportation of fat to the liver as the glycogen disappears? Were it derived from the glycogen we should expect the accumulation of fat to be most active *during* the rapid disappearance of glycogen and not some time after the glycogen had reached so low a level. But there can be no doubt that as the glycogen disappears the fat increases. The evidence of this increase being due to a transport from the adipose tissue of the rest of the body must first be considered. That fats are transported to the liver and stored there is shown by experiment. But these are food fats, and the proof that the body fats can be so transported is by no means so satisfactory. Nasse, as already pointed out, admits that such a transport has only been proved in phosphorus poisoning, though he states that in starvation the serum may become milky from the taking up of the fats from the body. This, of course, does not prove that they are transported to the liver."

In experiments made by Paton with rabbits the conclusion is reached that fatty acids are directly produced in the liver by the metabolism of glycogen, while the view that the increase of fats in the liver noticed under certain conditions is due to transport from the adipose tissues is untenable. Further, Paton's experiments tend to indicate that fats are not formed in the liver from proteids; at least, the addition of an excess of proteid to the food does not lead to an accumulation of fat in the liver.

Finally, we may add Paton's summary of conclusions as showing in concise form the various results arrived at in this important investigation:

"Throughout the various parts of the liver there is a uniform distribution of the substances soluble in ether—the so-called 'fats.'

"In animals in the same condition the percentage amount of substances soluble in ether is fairly uniform.

"The ether extract varies greatly in amount, but is on an average about 5 per cent. of the liver substance.

"After extraction with ether a certain amount of fatty acids remains partly in combination with bases as soaps, partly in other chemical combinations possibly of the nature of nucleins or of lecithin albumins, which may be decomposed by hydrochloric acid.

"The ether extract of the liver contains from 40 to 90 per cent. of fatty acids. The fatty acids constitute roughly about 3 per cent. of the liver.

"The fats of the liver are distinguished by containing a much smaller proportion of oleic acid than the other fats of the body.

"Lecithin is a constant constituent of the ether extract of the liver, and its amount is fairly constant, averaging 2.35 per cent. of the liver substance, or 10.1 per cent. of the solids of the liver. It holds nearly one-half of the fatty acids in combination.

"The amount of lecithin varies inversely with the amount of fatty acids.

"The amount of cholesterin is smaller than is usually stated, averaging about 0.039 per cent. of the liver substance in the rabbit and 0.029 per cent. in the cat.

"The amount of substances other than fat, lecithin and cholesterin in the ether extract of the liver varies from 4.2 to 22 per cent. of the extract, being on an average 12.1 per cent. The proportion is lowest when the amount of fatty acids is highest. Pigments constitute only a small part of this.

"Fats may be transported to and accumulated in the liver. Fat may also be produced in the liver. Fats do not undergo the same simple transformation in the liver as glycogen does.

"Fats accumulated in the liver disappear either by being carried from the organ or by being metabolized in the organ.

"Some of the fatty acids are linked with phosphorus and cholin to form lecithin, and this lecithin is a forerunner of the nucleo-compounds of the body.

"The liver thus seems to have the function of utilizing and economizing the phosphorus of the body by combining it with fatty acids as a stage in its reconversion to nuclein compounds.

"In the case of the usual storage of fat in the liver there is no diminution in the amount after a fast of fifty-six hours in cats and ninety-six hours in pigeons. When an excessive amount of fat has been stored in the liver of cats it is got rid of to a large extent in sixty-eight hours. The liver maintains a store of fatty acids during inanition.

"An excess of fat taken in the food is largely stored in the livers of certain animals, *e.g.*, cat and rabbit.

"The amount of fat in the liver is not proportionate to the amount of glycogen present. A diet rich in carbohydrate tends to increase the amount of fat in the liver. As hepatic glycogen disappears there is an actual increase in the amount of fatty acids in the liver. These acids have the characteristic high melting-point of the acids of the liver.

"During the period of the accumulation of fatty acids the blood-serum remains perfectly clear. The evidence thus points to the formation of the fatty acids from the glycogen. The addition of an excess of proteid to the food does not lead to an accumulation of fat in the liver."

THE INFLUENCE OF ALCOHOL UPON THE CHEMICAL PROCESSES OF DIGESTION.*

In considering the influence of alcohol upon digestion we must have, at the outset, a clear understanding of what is meant by or included under the term digestion. Primarily, the object of digestion is to convert the insoluble and non-diffusible food-stuffs into forms capable of being absorbed. This is accomplished mainly through the agency of certain ferments or enzymes contained in the several digestive fluids, viz., the saliva, gastric juice, and pancreatic juice. The first of these fluids, secreted by three pairs of glands (salivary glands) which pour their secretions into the mouth, acts solely on starchy, farinaceous, or carbohydrate foods, transforming them into soluble dextrins and sugar—a process which commences in the mouth and continues for a short time in the stomach until the ferment of the saliva is finally destroyed by the increasing acidity of the gastric juice. The gastric juice, on the other hand, secreted by the tiny cells lining or composing the mucous membrane of the stomach, acts solely upon the proteid or albuminous foods, transforming them into a number of products characterized especially by their solubility and diffusibility. When the acid chyme leaves the stomach it passes through the pylorus into the small intestine, where it is exposed to the double action of the bile and pancreatic juice, the latter a powerful digestive fluid containing three distinct ferments. One of these ferments, an amylolytic enzyme, is apparently identical with the ferment of the saliva, and like the latter, converts any unchanged starch into soluble dextrins and sugar. The second ferment is a powerful proteolytic enzyme called trypsin, which, in a neutral or alkaline solution, changes proteid matter into a row of soluble and diffusible products somewhat different in nature from those formed in acid gastric digestion. The third ferment is an adipolytic or fat-splitting ferment, which apparently transforms at least a portion of the fats of the food into soluble forms. This threefold action of the pancreatic juice may continue for some time in the small intestine, but as the peristaltic or wave-like contraction of the intestinal walls tends to push the contents of the tube onward toward the large intestine, and as absorption is quite rapid at this point, the conditions gradually become unfavorable for digestive action. The fluid and soluble matter is gradually absorbed into the blood and chyle, the contents of the intestine thereby becoming more or less viscous and compact, while the onset of fermentative and putrefactive changes gives rise to an acid reaction, all of which is inimical to the continuation of pancreatic digestion.

This briefly represents, in a general way, the character of the changes induced by the several digestive juices—chemical changes in the character of the various food-stuffs induced by the several digestive ferments or enzymes, and which are absolutely essential for the advantageous utilization of the food by the body. It is quite evident, however, that the rate and extent of digestion may be modified by a variety of circumstances, and these are by no means limited to the action of the respective ferments or enzymes. Thus, the process of secretion in a given set of glands may be so modified that the yield of digestive fluid is greatly reduced, thus diminishing the amount of fluid available for digestion; or the secretion may be so modified in composition that it is less adapted for carrying out its normal function. On the other hand, there may be an increased secretion of the digestive fluid by which digestion is accelerated through the mere increase in volume of the active fluid, or the strength of the secretion may be increased, thus leading to more vigorous digestive action. Such changes may be induced by an influence exerted through the nervous system, for, as is well known, secretion is more or less controlled, both as regards the quantity and composition of the fluid, by certain nerve-fibres; and thus an agent may have an important influence upon digestion through its influence upon certain parts of the nervous system, by which the activity of the secreting gland is controlled and modified, and this quite independent of any specific action the agent may exert, by its mere presence, upon the chemical and solvent action of the secretion or its contained ferment.

---

* Extract from a paper by R. H. Chittenden and Lafayette B. Mendel, on "The Influence of Alcohol and Alcoholic Drinks upon the Chemical Processes of Digestion," published in the *American Journal of the Medical Sciences* for January-April, 1896.

Again, as is well known, excessive accumulation of the products of digestion tends to retard or even check the rate of digestion through an inhibitory influence upon the activity of the ferment, hence modifications in the rate of absorption have a direct influence upon the digestive process. Consequently, an agent which by its mere presence in the stomach-contents, for example, is without direct action on the ferment, or even without influence when absorbed into the blood on the process of secretion, may indirectly influence digestion by either retarding or accelerating absorption. Further, the mechanical movements of the gastro-intestinal tube, *i.e.*, peristalsis, have their influence upon digestion, solution of the proteid foods especially being facilitated by the vigorous churning to which the contents of the stomach and intestine are subjected under normal circumstances. The onward movement of the contents of the alimentary tract is likewise governed by the proper contraction of the longitudinal and circular muscle-fibres of the intestine, and as all of these muscles, both of the stomach and intestine, are controlled by the nervous system, it follows that digestion may be somewhat modified through this channel, indirectly to be sure, but to quite an appreciable extent. Hence certain agents, acting primarily upon the nervous system, may indirectly in this manner have an influence upon digestion without showing any special action upon the digestive enzymes, or upon the process of secretion or absorption..

From these brief statements it is evident that what we term digestion is a complicated chemico-physiological process involving not only the simple solvent or digestive action of the several digestive juices, or of their contained ferments or enzymes, but dependent in no small degree for its successful working upon the kindred processes of secretion, absorption, etc. Hence, in attempting any accurate and complete study of the influence of alcohol upon digestion, there must be a clear recognition of the fact that no single line of experimentation can lead to full and concise results covering the whole ground of inquiry. For experimental purposes, therefore, the subject must be studied under several distinct heads, as (1) the influence of alcohol and alcoholic drinks upon the process of secretion; (2) upon the process of absorption; (3) upon peristalsis; and (4) upon the purely chemical processes of digestion. It is the latter phase of the subject which has been our study during the past year, and the report which we now offer covers simply the influence of alcohol and a variety of alcoholic drinks upon the digestive action of the several digestive fluids and their contained ferments or enzymes. Such a study cannot properly be carried out on animals nor on human beings, since it would then be almost impossible to connect the results obtained with their true cause. We must at first exclude all of the accessory influences connected with secretion, absorption, and peristalsis if we are to learn the influence of alcoholic drinks upon digestive action, and this is best done by artificial digestive experiments in which saliva, gastric juice, and pancreatic juice are allowed to act under definite and constant conditions upon the several food-stuffs, and any variations in activity carefully determined. In this way, and in this way only, in our opinion, is it possible to measure the exact influence of alcohol and alcoholic fluids upon digestive action; *i.e.*, upon the purely chemical processes of digestion.

GASTRIC DIGESTION (*i.e.*, PROTEOLYSIS BY PEPSIN-HYDROCHLORIC ACID).

The solvent action of the gastric juice on proteid or albuminous foods is due solely to the presence of pepsin-hydrochloric acid, but the amount of both pepsin and acid in the natural secretion varies considerably with different states of the system. The average amount of hydrochloric acid, however, is approximately 0.2 per cent., while to the pepsin no definite figure can be given, since as yet the chemist has not been able to isolate the ferment in a pure state. Further, it is quite certain that both ferment and acid are subject to great variation in the amount present in the secretion at different stages of digestion and under different conditions of health and nutrition. In view of these facts we have experimented under varying conditions in order that our results may have as wide an application as possible.

The methods pursued were as follows:

(*a*) *With fluid egg-albumin.** The albumin solution was prepared after the method recommended by Schütz.† A quantity of undiluted white of egg was freed from globulin by the addition of hydrochloric acid of specific gravity 1.12 (4.2 c.c. acid to 300 c.c. of albumin), the mixture shaken vigorously, and after standing some hours filtered through paper. The clear acid fluid was then made exactly neutral with dilute sodium carbonate, after which it is ready for use. Ten c.c. of this fluid contain a little less than 1 gram of coagulable proteid, the exact amount being determined by heat-precipitation, collecting the coagulum on a weighed filter and drying at 110° C.

The digestive experiments were made in series, each individual mixture containing the same volume of the prepared albumin solution (10–20 c.c.), together with the same amount of pepsin and acid. The albumin solution was introduced into a small flask of 200 c.c. capacity provided with a suitable stopper, water and alcohol or alcoholic fluid being added to make the volume up to 50 c.c.

Lastly, 50 c.c. of 0.4 per cent. hydrochloric acid, containing a known amount of pepsin, were added, making the total volume of each mixture 100 c.c., and the strength of the acid 0.2 per cent. HCl. It is thus evident that the only variable element in the mixtures of a given series is the amount of alcohol or alcoholic fluid present. The flasks were then placed in a water-bath, kept approximately at the body temperature (38–40° C.) for a definite period—usually five to seven hours. At the end of the allotted time the extent of digestive action was determined by simply heating the mixtures to boiling, neutralizing the acid fluid by addition of an equivalent amount of sodium carbonate in a 1 per cent. solution, and collecting the precipitate of unaltered albumin or acid-albumin on a weighed filter, washing it with boiling water until free from chlorides, and then drying at 110° C. until of constant weight. The difference between the weight of the coagulable albumin introduced and the amount found at the end of the experiment gives the amount of soluble digestive products, *i.e.*, albumoses and peptones, formed under the conditions of the experiment. In this way it is possible to measure accurately the extent of proteolytic action under varying conditions.

(*b*) *With coagulated blood-fibrin.* Fresh blood-fibrin from the blood of oxen or sheep was washed with water until quite white, then boiled repeatedly with water, after which it was thoroughly extracted with cold alcohol, boiling alcohol, and, lastly, with ether. It was then ground to a coarse powder and passed through a sieve, so constructed that the particles collected were all approximately of the same size. The so-prepared powder was then dried at 110° C. until of constant weight.

The digestive experiments with this form of proteid matter were conducted as follows: A definite amount of alcohol or alcoholic fluid was introduced into each flask, water being added to make the volume 50 c.c. Then 50 c.c. of 0.4 per cent. hydrochloric acid containing a known amount of pepsin were added, thus making the total volume of fluid 100 c.c. To this mixture two grams of the prepared fibrin were added. Thus, as in the experiments with fluid egg-albumin, all of the mixtures of a given series were exactly alike in containing the same volume of 0.2 per cent. hydrochloric acid, the same amount of pepsin, etc., but unlike in the percentage of alcohol or alcoholic fluid present. For comparison, one mixture of each series contained no alcohol whatever. When prepared, the mixtures of a given series were placed in a bath at 38°–40° C. for two or three hours, where they were kept under exactly the same conditions, being stirred or shaken to the same extent, etc. At the end of the given period the mixtures were heated to boiling to destroy the ferment, after which the undigested residue was collected on a weighed filter, washed with boiling water until free from all soluble matter, then dried at 110° C. until of constant weight. The difference between the weight of the fibrin taken and the undissolved residue is a true measure of the digestive action under the conditions of the experiment.

---

* See R. H. Chittenden: "Observations on the Digestive Ferments," *Medical News*, Philadelphia, February 16, 1889.

† *Zeitschr. f. physiol. Chem.*, Band ix., p. 581.

ACTION OF ABSOLUTE ALCOHOL (99.5–100 PER CENT.).

The percentages of alcohol referred to are percentages by volume unless otherwise specified. The pepsin employed was a very active scale pepsin marked 1:4000.

Experiment 1.

Conditions:

Proteid = fluid egg-albumin (20 c.c.).

20 c.c. albumin solution contain 1.6398 grams dry albumin.

0.03 gram pepsin; 0.2 per cent. hydrochloric acid.

Period of digestion $6\frac{11}{12}$ hours at 38°–40° C.

Alcohol. Per cent.	Undigested albumin. Gram.	Proteid digested. Per cent.	Relative proteolytic action.*
0	0.1850	88.8	100.0
6	0.2708	83.5	94.0
12	0.5473	66.7	76.0
18	0.6703	59.2	66.6

Experiment 2.

Conditions:

Proteid = fluid egg-albumin (15 c.c.).

15 c.c. albumin solution contain 1.0522 grams dry albumin.

0.0024 gram pepsin; 0.2 per cent. hydrochloric acid.

Period of digestion $5\frac{1}{4}$ hours at 38°–40° C.

Alcohol. Per cent.	Undigested albumin. Gram.	Proteid digested. Per cent.	Relative proteolytic action.
0	0.4007	62.0	100.0
1	0.4075	61.3	98.8
3	0.5146	51.1	82.4
6	0.6256	40.6	65.4

Experiment 3.

Conditions:

Proteid = egg-albumin (10 c.c.).

10 c.c. albumin solution contain 0.8199 gram dry albumin.

0.03 gram pepsin; 0.2 per cent. hydrochloric acid.

Period of digestion $5\frac{1}{6}$ hours at 38°–40° C.

Alcohol. Per cent.	Undigested albumin. Gram.	Proteid digested. Per cent.	Relative proteolytic action.
0	trace	100.0	100.0
1	0.0100	98.8	98.8
3	0.0130	98.5	98.5
5	0.0250	97.0	97.0
8	0.0699	91.5	91.5
10	0.0875	89.4	89.4

Experiment 4.

Conditions:

Proteid = fluid egg-albumin (20 c.c.).

20 c.c. albumin solution contain 1.9198 grams dry albumin.

0.05 gram pepsin; 0.2 per cent. hydrochloric acid.

Period of digestion $5\frac{1}{2}$ hours at 38°–40° C.

Alcohol. Per cent.	Undigested albumin. Gram.	Proteid digested. Per cent.	Relative proteolytic action.
0	0.0887	95.4	100.0
1	0.0740	96.1	100.8
5	0.2617	86.4	90.5
10	0.5373	72.0	75.5
15	0.5859	69.5	72.8

Experiment 5.

Conditions:

Proteid = blood-fibrin (2 grams).

0.016 gram pepsin; 0.2 per cent. hydrochloric acid.

Period of digestion $2\frac{1}{4}$ hours at 38°–40° C.

Alcohol. Per cent.	Undigested fibrin. Gram.	Proteid digested. Per cent.	Relative proteolytic action.
0	0.5834	70.9	100.0
1	0.5727	71.4	100.7
3	0.6273	68.7	96.8
5	0.6493	67.6	95.3

The following five series of experiments were all made after the same plan, each mixture containing 2 grams of blood-fibrin, 0.016 gram pepsin in 0.2 per cent. hydrochloric acid, and warmed at 38°–40° C. for 2½ hours.

---

* Expressing the relative extent of digestive action as compared with the action of the control-experiment, the latter being taken as 100.

Experiment 6.

Alcohol. Per cent.	Undigested fibrin. Gram.	Proteid digested. Per cent.	Relative proteolytic action.
0	0.3676	81.7	100.0
10	0.5970*	70.2	85.9

Experiment 7.

Alcohol. Per cent.	Undigested fibrin. Gram.	Proteid digested. Per cent.	Relative proteolytic action.
0	0.2013	90.0	100.0
5	0.2601	87.0	96.6

Experiment 8.

Alcohol Per cent.	Undigested fibrin Gram.	Proteid digested. Per cent.	Relative proteolytic action.
0	0.1759	91.3	100.0
5	0.2145	89.3	97.8

Experiment 9.

Alcohol Per cent.	Undigested fibrin. Gram.	Proteid digested. Per cent.	Relative proteolytic action.
0	0.2027	89.9	100.0
5	0.2619	87.0	96.7

Experiment 10.

Alcohol. Per cent.	Undigested fibrin. Gram	Proteid digested. Per cent.	Relative proteolytic action
0	0.3881	80.6	100.0
4	0.4118	79.5	98.6

In the following three experiments the conditions were the same as in the preceding, excepting that the mixtures were warmed at 38°–40° C. for 2 hours instead of 2½ hours.

Experiment 11.

Alcohol. Per cent.	Undigested fibrin. Gram.	Proteid digested. Per cent.	Relative proteolytic action.
0	0.5315	73.5	100.0
2	0.5390	73.1	99.4

Experiment 12.

Alcohol. Per cent.	Undigested fibrin. Gram.	Proteid digested. Per cent.	Relative proteolytic action.
0	0.4630	76.9	100.0
2	0.4583	77.1	100.2

Experiment 13.

Alcohol. Per cent.	Undigested fibrin. Gram.	Proteid digested. Per cent.	Relative proteolytic action.
0	0.1970	90.2	100.0
5	0.2830	85.9	95.2

A careful study of the preceding results makes it evident that we cannot define with mathematical exactness the action of a given percentage of absolute alcohol on pepsin-proteolysis, since variations in the attendant conditions, *i.e.*, the relative amounts of pepsin, acid, and proteid, together with the period of digestion, the digestibility of the particular proteid, etc., are prone to modify the final result. Thus, with a weak gastric juice, where the amount of ferment present is small and digestive action consequently slow, or where the proteid material used is difficult of digestion, the retarding effect of a given percentage of alcohol is far greater than when the digestive fluid is more active; that is, when it contains more pepsin. (Contrast Experiments 1, 2, and 3.) Further, this difference of action is more pronounced the larger the percentage of alcohol present. Thus, in Experiments 2 and 3, where the difference in the amount of pepsin present is very great, the action of 1 per cent of absolute alcohol is essentially the same; but when the amount of alcohol is raised to 3, 5, or 6 per cent. then the difference in digestive action is very striking.

Bearing in mind the possibility of these variations incidental to variations in the attendant conditions, and recognizing the possibility and probability of just such variations in the human stomach, we may look at our results with a view to drawing some general conclusions. First, it is plainly manifest that in the presence of small amounts of alcohol (1–2 per cent. of absolute alcohol) gastric digestion may proceed as well or even better than under normal circumstances. In fact, many of our experiments show a slight increase in digestive power when the mixture contains 1 or 2 per cent. of absolute alcohol. This increased digestive action, though slight, occurs too frequently to be the result of mere accident, and apparently indicates a tendency for alcohol, when present in small quantity, to increase slightly the digestive action of pepsin-hydrochloric acid; or, in other words, to so stimulate the ferment that it can accomplish somewhat more, under given conditions, than it otherwise could do. As the percentage of alcohol is raised, retardation or inhibition becomes more noticeable, although ordinarily it is not very pronounced until the digestive mixture contains 5–10 per cent. or more of absolute alcohol. With 15–18 per cent. of absolute alcohol, digestive action may be reduced one-quarter or even one-third, the exact amount of retardation, however, being especially dependent upon the strength or activity of the gastric juice and upon the natural digestibility of the proteid material. (See Experiments 1, 3, 4, and 6.) It is to be remembered, however, that 18 per cent. of absolute alcohol would be equivalent to 36 per cent. of proof-spirit, so that if we should assume the contents of a human stomach at a given period to be one-third proof-spirit, it might perhaps be considered that digestive action would be retarded to the extent of 25–35 per cent., provided the gastric juice present in the stomach was of fair strength and the proteid matter of ordinary digestibility. Such percentages of proof-spirit, however, are not likely to be long present in the stomach, and it is perhaps idle to speculate on such hypothetical cases. We may in this connection, however, again emphasize the fact that the stronger the gastric juice and the more digestible the proteid food undergoing digestion the less retardation will a given percentage of alcohol produce, while, on the other hand, the weaker the gastric juice and the more indigestible the proteid the greater will be the inhibition caused by a given percentage of alcohol. In other words, those variations which must naturally exist in the stomach contents of different individuals, both in health and disease, will lead to different degrees of retardation in the presence of given percentages of absolute alcohol. It would, therefore, be unwise to make a general specific statement regarding the action of a given percentage of alcohol. Under definite conditions, however, as our experiments plainly show, the presence of a definite amount of alcohol always leads to essentially the same results.

---

* Filtered very slowly and could not be washed thoroughly, hence the result is only approximately correct.

In order to prevent any misinterpretation of our results we would again call attention to the fact that we are dealing here with only one of the four questions that need to be answered before we can hope to fully understand the influence of alcohol on gastric digestion as a whole. Thus, our results afford plain evidence of the influence of alcohol on the digestive or solvent power of the gastric juice, but we should not be justified in arguing that exactly the same results would follow from the introduction of alcohol into the living stomach. The action of a given percentage of alcohol on proteolysis alone would be essentially the same in the stomach as in a beaker, provided the alcohol was not absorbed into the blood and thus removed from contact with the digestive mixture, and provided it did not exert any influence on the character of the gastric juice secreted. But it is easily conceivable that a percentage of alcohol which does not interfere with solution of the proteid foodstuffs may so modify the amount or character of the secretion that digestion might be greatly stimulated or greatly retarded. Further, as already stated, the presence of alcohol in the stomach may so affect absorption and peristalsis that the rate of digestion may be modified from this cause; hence, the results above recorded are to be used only in drawing conclusions as to the effect of various percentages of alcohol on the purely chemical process of gastric digestion, *i.e.*, on pepsin-proteolysis.

With reference to those other questions which have such an important bearing on gastric digestion we must await the appearance of more complete experimental data for their solution, and not until then can we explain fully the action of alcohol on digestion in the broad sense indicated.

In conclusion, it is to be noted that our results are more or less in accord with what has been previously published concerning the action of alcohol on gastric digestion. Thus, Bikfalvi[*] found in artificial digestive experiments, that alcohol, even in small quantities retards normal gastric digestion. Klikowicz[†] found that the presence of 5 per cent. of alcohol in the digestion of egg and serum-albumin led to somewhat variable results, although, as a rule, there was an indication of a slight stimulation of proteolytic action. In the presence of 10 per cent. of alcohol there was always marked retardation, while 15, 20, and 30 per cent. of alcohol checked digestion to a marked degree.

---

[*] *Jahresbericht für Thierchemie*, xv., p. 273.

[†] *Virchow's Archiv*, Band 102, p. 376.

Roberts found by artificial-digestion experiments that in the presence of less than 10 per cent. of proof-spirit there was no appreciable retardation. With 10 per cent. retardation was only barely detectable. With 20 per cent. there was quite distinct, but still only a slight, retardation. Above this point, however, the inhibitory effect of alcohol increased rapidly.*

That the action of a digestive ferment may be both stimulated and retarded by the same substance, according to the quantity present, has been already demonstrated; hence there is no inconsistency in the above results with alcohol The same action has likewise been observed with yeast-cells.

PANCREATIC DIGESTION.

In studying the influence of alcohol upon pancreatic digestion our experiments have been limited mainly to the proteolytic action, or albumin-digesting power, of the fluid, since this may be considered as the most important digestive function of the secretion. Further, in our experiments with saliva, to be detailed later on, we have acquired all that seems necessary for us to know regarding the influence of alcoholic fluids upon the starch-digesting power of the amylolytic ferments common to both the saliva and the pancreatic fluid. So far as our knowledge at present extends, there is no difference between the saliva and pancreatic juice in their digestive action on farinaceous foods, so that what is found true with regard to the amylolytic action of the saliva is also applicable to the pancreatic fluid. Hence, in studying pancreatic digestion, our experiments have been limited to the influence of alcoholic fluids upon the tryptic ferment which is so characteristic of this secretion.

The natural secretion from the pancreatic gland has an alkaline reaction, but in the small intestine pancreatic digestion is as liable to be carried on in a neutral reacting fluid as in an alkaline medium, and as our experiments were designed mainly to show the action of the various alcoholic fluids upon the digestive power of the ferment, it seemed best to use a neutral reacting pancreatic juice. The latter was prepared, according to the method originally suggested by Kühne, from dried pancreas which had been previously extracted with alcohol and ether. Forty grams of the prepared pancreas were warmed at 40° C. for twenty-four hours with 500 c.c., 0.1 per cent., salicylic acid, the solution filtered and neutralized with dilute sodium carbonate and then diluted with water to 1000 or 1500 c.c. In order to prevent the possibility of putrefactive changes, crystals of thymol were kept floating on the fluid.

In testing the digestive or proteolytic action of the pancreatic juice under the various conditions set forth, 1 gram of dry, pulverized blood-fibrin was weighed out into a suitable flask, 25 c.c. of water containing sufficient of the alcoholic liquor to give the desired percentage to the whole mixture were then added, followed by 25 c.c. of the neutral pancreatic juice, thus making a total volume of 50 c.c. for each mixture. The mixtures of each series were then placed in the same water-bath at 38°-40° C., where they were kept at the body-temperature for six to seven hours with frequent shaking, the flasks being tightly stoppered. At the end of the given period the undissolved fibrin was filtered off on weighed filter-papers, washed thoroughly with warm water, and then dried at 110° C. until of constant weight. In this manner it was possible to measure very accurately the influence of various forms and quantities of alcoholic liquors upon the pancreatic digestion of proteid foods.

In view of the position which pancreatic digestion occupies in the digestive process, it is readily seen that it is more desirable to ascertain the influence of small quantities of alcoholic liquors than large amounts, since absorption must naturally lead to a decided diminution of alcohol, etc., before these fluids can normally become mixed with the pancreatic juice and partially digested food-material in the small intestine. Hence, we have laid more stress, as a rule, upon the influence of small percentages of the various fluids experimented with, and only occasionally have tried the action of large quantities.

---

* Digestion and Diet, p. 132.

ACTION OF ABSOLUTE ALCOHOL (99.5 TO 100 PER CENT.).

Experiment 80.

Period of digestion 7 hours.

Absolute alcohol. Per cent.	Undigested fibrin. Gram.	Proteid digested. Per cent.	Relative proteolytic action.
0	0.5677	43.3	100.0
2	0.6102	39.0	90.0
5	0.6574	34.3	79.2
10	0.7394	26.1	60.2
20	0.8446	15.6	36.0

Experiment 81.

Period of digestion 6 hours.

Absolute alcohol. Per cent.	Undigested fibrin. Gram.	Proteid digested. Per cent.	Relative proteolytic action.
0	0.3467	65.33	100.0
0.25	0.3375	66.25	101.4
0.50	0.3563	64.37	98.5
1.00	0.3599	64.01	97.9
2.00	0.3521	64.79	99.2
3.00	0.3780	62.20	95.2

Experiment 82.

Period of digestion 6 hours.

Absolute alcohol. Per cent.	Undigested fibrin. Gram.	Proteid digested. Per cent.	Relative proteolytic action.
0	0.3058	69.42	100.0
1	0.3220	67.80	97.6
3	0.3689	63.11	90.9
5	0.3888	61.12	88.0
10	0.5080	49.20	70.8
15	0.5931	40.69	58.6
20	0.7012	29.88	43.0

These results with absolute alcohol indicate that the proteolytic ferment of the pancreatic juice is more sensitive to absolute alcohol than the ferment of the gastric juice. Retardation of digestive action is more pronounced even with small amounts of alcohol. Further, as in the case with pepsin, the weaker the digestive powers of the pancreatic juice the greater the retarding action of absolute alcohol. This is clearly seen in comparison of Experiments 80 and 82, and is quite in harmony with what is known regarding the general nature of the digestive ferments or enzymes. When the amount of alcohol present in the digesting mixture is less than 1 per cent. the retardation of digestive action is very slight, provided the ferment is fairly vigorous in its action.

SALIVARY DIGESTION.

In considering the influence of alcohol on salivary digestion, it is to be remembered that the latter process has for its main object the digestion of the farinaceous foods. This property is shared in common with the pancreatic juice, the utilization of all farinaceous foods by the body being dependent almost wholly upon the so-called amylolytic power of these two secretions.

Salivary digestion is a comparatively rapid process, the transformation of the insoluble starch into soluble dextrines and sugar taking place in a relatively short period, as contrasted with the proteolytic action of either the gastric or pancreatic juice. Amylaceous or farinaceous foods are exposed to the action of the saliva in the mouth for only a short interval, but the evidence at present available points to the probable continuation of salivary digestion in the stomach for from ten to thirty minutes before the amylolytic ferment is killed by the increasing acidity of the gastric juice. In view of this relatively short period of digestion, retardation of amylolytic action may become a serious matter, since even slight retardation may mean the loss of more or less nutriment to the body. The amylolytic ferment of the pancreatic juice, however, may be able to convert the unchanged starch in the small intestine, providing the influence of the retarding agent does not extend so far. But in any event, retardation or stoppage of salivary digestion must be a serious evil, and it is to be remembered that the amylolytic ferment of the pancreatic juice is closely akin to, if not identical with, the ferment of the saliva, and hence is susceptible to the same influences that affect the salivary ferment.

METHODS EMPLOYED.

In testing the influence of alcoholic liquors on the salivary digestion of starchy foods the following method was most generally employed: Ten c.c. of a freshly prepared starch-paste (1 per cent.) were introduced into a suitable flask, a given volume of the alcoholic fluid together with sufficient water to make the resultant mixture up to 90 c.c. added; and, lastly, 10 c.c. of neutralized and filtered saliva, which had been previously diluted to some definite volume. The completed mixture was thus composed of 100 c.c. The time at which the saliva was added was carefully noted, and the mixture placed in a suitable water-bath kept at 38°–40° C. In order to measure the rate of digestion a drop of fluid was withdrawn at intervals, placed on a white porcelain surface, and tested with a drop of dilute iodine-solution. The color obtained with iodine under these conditions is dependent upon the extent of amylolytic action. Thus, the presence of soluble starch, the first product formed, is indicated by a blue color. As digestion proceeds the blue color gives place to a reddish color with iodine, owing to the presence of erythrodextrin, while the final products of amylolytic action, maltose and achroödextrins give no color whatever with iodine. The time when this so-called "achromic" point is reached is carefully noted, and the number of minutes required for the appearance of the "achromic" point serves as a measure of the rate of amylolytic action.

A method less frequently used in our experiments, but better adapted to measuring accurately small shades of difference, was as follows: One gram of arrowroot-starch was made into a paste with 40 c.c. of water, 50 c.c. of water alone (in the control) or with the required volume of alcoholic fluid to give the desired percentage were then added; and, lastly, 10 c.c. of a diluted neutral saliva. The mixture, or series of mixtures, was then placed in a bath at 38°–40° C. for thirty minutes, after which the solution was heated to boiling to prevent further action of the enzyme. The resultant solution was then made up to 150 c.c., and the extent of amylolytic action ascertained by determining in one-sixth of the solution the amount of maltose formed by the use of Allihn's[*] gravimetric method. From the amount of reduced copper thus obtained, the amount of maltose was calculated on the basis of Salomon's[†] statement that 100 parts of anhydrous maltose will form 114 parts of reduced copper when boiled with Fehling's solution after the Allihn method.

It is, of course, understood that in both methods all of the mixtures belonging to a given series were treated with the same specimen of saliva.

ABSOLUTE ALCOHOL (99.5 TO 100 PER CENT.).

Experiment 116. (Saliva 1:15.)[‡]

Alcohol.	Appearance of the achromic point.
0 per cent	7 minutes.
0.5 "	7 "
1.0 "	7 "
2.0 "	7 "
5.0 "	7 "
10.0 "	7 "

Experiment 117. (Saliva 1:20.)

Alcohol.	Appearance of the achromic point.
0 per cent	7 minutes.
1 "	7 "
10 "	7 "

Experiment 118. (Saliva 1:30.)

Alcohol.	Appearance of the achromic point.
0 per cent	27 minutes.
0.5 "	27 "
1.0 "	27 "
2.0 "	27 "
5.0 "	27 "
10.0 "	25 "

From these results it is plainly manifest that absolute alcohol has very little influence upon the amylolytic or starch-digesting power of neutral saliva. Only when the saliva, added to the digestive mixture, is diluted in the proportion of 1 to 30 does the presence of even 10 per cent. of alcohol have any measurable influence, and then only to retard the appearance of the achromic point two minutes. As this percentage of absolute alcohol is equal to at least 20 per cent. of proof-spirit, it follows that pure alcohol free from admixture is practically without influence upon the digestion of farinaceous foods by the saliva.

---

[*] *Zeitsch. f. Analyt. Chemie*, Band xxii., p. 448.

[†] *Journal für Praktische Chemie*, Band xxviii., p. 109.

[‡] Being the dilution of the saliva added to the digesting mixture; *i.e.*, 1 part of fresh saliva in 15 parts of water. It is to be remembered, however, that in the digestive mixtures (100 c.c.) the dilution of the saliva is increased tenfold.

A more accurate testing of this question was attempted by the use of the second method above described, with the following results

Experiment 119 (Saliva 1·4.)

Alcohol Per cent	Reduced copper in ½ Gram	Maltose formed. Per cent *	Relative amylolytic action
0	0.0885	31.05	100.0
0.5	0.0918	32.21	103.7
1.0	0.0908	31.86	102.6
3.0	0.0911	31.96	102.9
5.0	0.0897	31.47	101.3
10.0	0.0862	30.25	97.4

Experiment 120 (Saliva 1:5.)

Alcohol. Per cent	Reduced copper in ½ Gram.	Maltose formed. Per cent.	Relative amylolytic action.
0	0.1436	75.5	100.0
5	0.1439	75.7	100.2
10	0.1367	71.9	95.2
15	0.1309	68.0	90.0

Experiment 121. (Saliva 1:4.)

Alcohol. Per cent.	Reduced copper in ½ Gram.	Maltose formed. Per cent.	Relative amyl action.
0	0.122	64.2	100.0
5	0.120	63.1	98.2
10	0.119	62.5	97.3
15	0.114	60.0	93.4

Experiment 122 (Saliva 1·2.)

Alcohol Per cent.	Reduced copper in ½. Gram	Maltose formed Per cent.	Relative amylolytic action
0	0.132	69.4	100.0
5	0.131	68.9	99.2
10	0.126	66.3	95.5
15	0.125	65.7	94.6

At first glance, these results would seem to be somewhat opposed to those obtained in the first series of experiments but such is not the case. The first method simply tells us the time when all the starch has been transformed into achroödextrin and maltose. The second method, however, tells us more than this, viz., the actual amount of *maltose* that has been formed, and as a certain amount of achroödextrin can be transformed into maltose by the continued action of the salivary ferment it follows that this latter method gives us a clearer knowledge of the influence of alcohol upon the secondary action of the amylolytic enzyme. Thus, we find that small amounts of absolute alcohol may actually cause an increased formation of maltose. On the other hand, the presence of 10 or 15 per cent. of absolute alcohol leads to a distinct retardation in the formation of sugar, although the inhibition is not very pronounced considering the amount of alcohol present. This retardation of the secondary action of the ferment is perhaps suggested by the slight delay in the appearance of the achromic point in Experiment 118, in the presence of 10 per cent. of absolute alcohol.

---

* Calculated on the 1 gram of starch employed.

Department of Hygiene.

WITH SPECIAL REFERENCE TO STATE AND PREVENTIVE MEDICINE.

Edited by E. O. SHAKESPEARE, M.D.. PH.D.,

(PHILADELPHIA.)

THE PRODUCTION, TRANSPORT, SALE, AND DELIVERY OF DAIRY PRODUCTS SHOULD BE UNDER THE SANITARY CONTROL OF THE LOCAL BOARD OF HEALTH WHERE SAID PRODUCTS ARE CONSUMED.

THE title of this paper expresses in general terms the opinion which the writer has formed after closely studying for some years the relations of the general milk-supply to the public health

The liability of many of the products of the dairy—and especially milk—to become in one way or another infected with germs of dangerous diseases before they reach the consumer hardly needs discussion or elaboration at the present time. Numerous careful and impartial investigations by most competent observers and experimenters in America and in Europe have placed this fact beyond reasonable dispute. Many an epidemic of typhoid fever and of diphtheria, and a considerable number also of scarlet fever, have been traced to an infected milk-supply. Cholera infantum, the scourge of young children living in the cities, has as its chief origin and factor of mortality a milk-supply vitiated by the presence and activity of numerous extraneous bacteria. The existence of tuberculosis in the first years of life may be fairly attributed in the majority of instances to the consumption of milk infected with the bacillus tuberculosis. The reader interested in this subject will find in the *Medical Record*, March 28, 1896, a tabulated list of nearly all the published accounts of milk-borne epidemics, occurring since the date of Hart's earlier list, by Freeman, an abstract of whose admirable paper is reprinted in this issue of the GAZETTE What relations measles, whooping-cough, and influenza may have with the dairy still remain undetermined; but viewed in the light of present knowledge of the etiology and mode of spread of the last three diseases, it seems possible enough that they also may ultimately be traceable in some instances to the consumption of contaminated milk.

There is ample reason, therefore, not only to justify but even to necessitate an effective intervention of the health authorities to regulate and control from the standpoint of public sanitation the production, handling, sale, and delivery of the products of the dairy.

What are the essential elements of such an effective intervention?

1st. The intervention should begin at the beginning, and continue until the consumer is reached.

2d. The intervention should be executed from first to last through the accredited and responsible agents of the local board of health of the consumer.

To undertake to elaborate these general principles in much detail were, perhaps, beyond the natural scope of the present editorial.

It would be well, however, as to the first, to keep in full view two fundamental truths, viz.: *a*, the dairy farm is the one chief source where milk becomes infected; *b*, the dealer's shop for reception of the milk-supply and its distribution to the consumer is the other chief source of contamination.

Unless the local board of health can prevent infection at both of these chief sources, it need not hope to do much toward great curtailment of the morbidity and mortality due to the use of infected milk among the consumers within its district. But unfortunately it is only one of these chief sources of infection that health boards as yet undertake to watch more or less closely—the shop of the milk-dealer. If the source of milk-production, the dairy farm, is to-day reached at all by the local health board it is only indirectly, and most ineffectively. But it is precisely here that such infections as typhoid fever, diphtheria and tuberculosis perhaps most frequently find entrance into the milk. A sanitary inspection—embracing the condition of the milch cows, their food and surroundings, the purity of the water-supply, the health of the dairymen, and the mode of collecting and handling the milk at the farm—made at times unexpected by the milk-producer and repeated at varying intervals, for the purpose of excluding diseased animals from the dairy herd and obviating all sources of infection of the milk, would seem to be absolutely essential for adequate protection of the health of the consumer. It goes without saying that the application of the tuberculin test—the only reliable means at present known for the detection of tuberculosis in apparently healthy cattle—should form the basis of exclusion of this very prevalent disease from the dairy herd. Of course a rigid sanitary supervision of the shop and operations of the milk-dealer at the other end of the line is equally essential.

As to the second essential, the health interests of the consumer demand that the sanitary supervision and regulation of the milk-supply shall be thorough and comprehensive, above all that these inspections—of such grave importance to the consumer—shall be made by agents whom he can most rely upon and trust as least likely to be guided or influenced by commercial motives.

It requires neither great acumen nor experience, only a little insight into the carelessness and gross frauds which so commonly disgrace, we may fairly say, the general milk trade of all cities and States, to arrive at the firm conviction that the only inspectors who could be safely trusted by the consumer would be those appointed and controlled by the local board of health—the authority, next to the consumer himself, chiefly and most nearly interested in the conservation of the public health. Inspectors appointed and controlled by such a disinterested and competent authority should, from the nature of the case, be more earnest and impartial in the performance of duty, and far less amenable to the venal temptations of interested producers or vendors, than agents for such a service whose employment is dictated or influenced by trade interests. In fact, in our opinion, sanitary inspection of dairy farms for the protection of the health of the consumer, unless it be performed under the direction and control of the guardians of the public health, must certainly prove to be illusive or disappointing.

The best machinery by which to exercise such a sanitary control and supervision of the general milk-supply of localities as we have thus briefly suggested, would seem to be that of a proper system of licenses to milk-producers and milk-vendors, grantable and revokable by the health authorities within the limits of whose jurisdiction the consumer resides or consumption takes place. Such licenses should be of nominal cost to the milk-producer and more expensive to the milk-vendor (for the reason that the invested capital of the milk-producer is usually much greater and the profits much less than those of the milk-dealer); and they should issue to the applicant solely on condition that the inspectors of the local board of health have free access at all reasonable times to the premises of the holder of the license, for the purpose of making such sanitary inspection as the respective board of health may authorize and direct. The milk from all unlicensed producers should be prohibited entrance, sale, distribution, or handling within the health district in question.

The city which inaugurates and effectively and constantly enforces such a policy for the protection of its milk-consuming denizens against extensive and frequent infection with the milk-borne diseases, as we have just outlined in brief, will surely witness such striking and lasting subsidence of morbidity and mortality by these diseases as is usually witnessed for the water-borne diseases after substitution of an old polluted water-supply by a new and pure potable water. Moreover, by such means a long step towards eventually stamping out tuberculosis in man, as well as in cattle, will have been taken. Shall we not tirelessly work for the accomplishment of this grand proximate end, especially since through employment of the same means we also visibly approach the more remote, but, if possible, even more important goal.

BANISH THE COMMON DRINKING-CUP.

We published in the April number of the Gazette an article from an occasional contributor strongly, and we think reasonably, condemning the further use of the common communion-cup.

While there may be some tender sensibilities in the way of prompt reform in the conduct of religious ceremonials which have been acquiesced in for ages, there certainly is not a scintilla of reason why we should not at once and absolutely exterminate the common drinking-cup from the schools and other places of public congregation of children. There is no sound reason why the individual drinking-cup should not regularly form a part of the personal kit of each child who goes to school; and there are most potent reasons why school-children should not be furnished the means of promiscuous use of a drinking-cup. To mention the matter only, is to suggest to careful parents why their children should not be permitted to use the drinking-cups used by other children.

There exists, for example, only one more certain means of transmitting diphtheria from one household to another than by the common use of drinking-cups which have been infected through contact with the lips of a child which carries the diphtheria infection in its mouth. The exception I refer to is the poisonous kiss from similarly infected lips.

Banish the common drinking-cup, among children especially, and teach these young people and their parents to understand the many reasons why it should be banished; we thereby accomplish much not only to check the ravages of diphtheria and other diseases which are contagious through the secretions of the mouth, but we at the same time also implant seeds in these young minds and in their homes which are bound to ultimately develop and fructify abundantly for the future advantage of public health and preventive medicine.

THE CRUSADE AGAINST SPITTING IN PUBLIC PLACES PROGRESSES.

We are much gratified that the vigorous stand which the Gazette took some months ago against the disgusting and oftentimes dangerous habit so common in America of spitting everywhere has met with the widespread public sympathy and practical endorsement of which we are constantly receiving evidence.

We reprint in this number the regulations of the New York health authorities firmly forbidding the nauseating practice in street-cars, railway stations and vehicles, hotel corridors, etc.; also a note conveying the information that the same matter has been brought before the city councils of St. Louis. Some time ago the Board of Health of Philadelphia made a move in the same direction, and we have chronicled the determination of health authorities in some other cities to move more actively for the suppression of spitting in public places. As far as we know there has been little, if any, opposition to these efforts of health bodies made by the officers of corporations of public carriers. This is a sign for encouragement. Various associations of public-spirited ladies in different parts of the country have already entered into this movement with an enthusiasm which argues well for an earnest popular support of the efforts of boards of health to suppress a habit which is as injurious as it is filthy.

SOME PRACTICAL RESULTS OF CHILD-STUDY.

By A. S. Whitney,
SAGINAW, MICH.

As so much literature bearing on this topic has very recently appeared from the pens of nearly all of the leading advocates of this line of study, I feel unwarranted in attempting little more than to present, as concisely as possible, a few personal observations consequent upon the direct application of child-study to the practical, everyday work of the schools. In so doing, however, I desire it understood at the outset that owing to the more thorough and scientific treatment of certain long-established physical laws, it has been deemed justifiable to consider them within the scope of this paper, though well aware that the propriety of this classification may be rightly questioned.

During the last school year it was deemed advisable, after some general preparation had been made, to direct the attention of our teachers to the investigation of certain phases of child-study, hoping thereby to arouse in them a deeper interest in child nature, to acquaint them more thoroughly with the child's growing powers and possibilities, to bring them into closer living, sympathetic touch with their pupils, and at the same time to verify, so far as possible, the practical claims of its leading students rather than to collect large masses of facts, and attempt general deduction therefrom.

With this end in view we first turned our attention to the investigation of vision. For this purpose a supply of Snellon's Test Cards was provided for the several school-buildings, and all of the teachers carefully instructed how to make the proper examination. As a result, out of the five thousand pupils whose eyes were tested an average of between fifty and sixty per cent. was found with impaired sight. This discovery was simply astounding even to teachers of long experience; it was quite one thing to read appalling accounts of defective vision, and quite another to realize its prevalence among their own pupils. It was also discovered that in some rooms, especially those of the younger teachers, many of the defectives were assigned to the darker and more distant sections, while those of normal powers occupied the more favored sittings. The remedy for this, readjustment, was direct and immediate, and the advantages gained very great. In extreme cases, however, this was insufficient, and the desired end was sought by informing the parents of the difficulty and strongly urging upon them the importance of consulting a physician, and, if necessary, of providing properly fitted glasses. By so doing it was found that in many instances the parents were wholly ignorant of the existing defect, and were ready and willing to follow the course suggested; that others, failing to realize the necessity, were careless and indifferent, and needed enlightenment; that still others, assuming the rights accorded to them as independent American citizens, had no hesitancy in informing the teachers, in language more forcible than courteous, that it was "their business to learn their children and not put such stuck-up notions into their heads, or make such dudes out of them." But in general the appeals of the teachers, appeals such as the parents had never been wont to experience, met with kind and hearty responses, and have resulted in the relieving of much distress and the opening of newer and brighter worlds to many a poor unfortunate.

Standing upon the vantage-ground of this experience, we next turned our attention to the examination of hearing, adopting the same methods of procedure, meeting the same difficulties, and applying the same remedies as in vision. The results were even more surprising, showing a general average of twenty to twenty-five per cent. of defectives. Of this number there were many of whom most pathetic tales of physical pain, of stunted intellects, of crushed spirits, might be graphically related ; but to do so would simply be multiplying the already well-established evidence of our too long delay and cruel neglect.

In this connection it may be of interest to state that two years ago an attempt was made at our Central school to iron out some of the many wrinkles necessarily incident to a graded system by establishing a new department, and placing it in charge of one of our best and most experienced teachers. This department was denominated "unclassified," in contradistinction to "ungraded" or even "truant," which bears such an unsavory reputation as to stigmatize all consigned thereto In this are placed all pupils of the grammar grades who for various causes are not adaptable to the work of the regular classes, hoping thereby more perfectly to adjust matter and method to individual needs and capacities than was otherwise possible. At the time of the examinations above specified, the significant fact was ascertained that every pupil enrolled in this department was suffering from defective vision, defective hearing, or from both.

When now we consider, in view of all this, that from a fifth to a fourth of all the pupils in our public schools are suffering from defective hearing; when we consider again the acknowledged stultifying effect of this misfortune upon the intellectual, business, and community life of each, as well as upon his capacity for enjoyment, and then, when we further consider that our best physicians assert that with proper care on the part of the parents and teachers this number would be reduced to two per cent., it requires no very great stretch of the imagination to compel the belief that vastly more practical good would redound to humanity by careful systematized examination and treatment of these defectives, than by so much religious devotion to the abstract, mechanical "drills" of our fathers.

From the beneficial results of the eye and ear studies above described, as everywhere apparent, it was deemed vital to carry the work farther and to pursue it more systematically. Accordingly, blanks based upon the one suggested by Dr. Krohn in the December number of the *Child-Study Monthly* were provided for permanent record of each individual pupil, the essential requirements of which are date, grade, school, name, age, sex, nationality, post-office address, birthplace, birthplace of father and mother, past and present health, causes of death of father and mother, vision, hearing, visual comparison and visual and auditory memory. The pupils are taken aside singly or in small groups, the various tests applied, and the facts ascertained carefully recorded. These records are then made a part of the official report of each pupil, the same as the standard items of attendance, tardiness, estimate of work accomplished, etc. While it will probably take years to realize the full salutary effect of this system, yet a sufficient amount has already been accomplished unhesitatingly to warrant the statement that in its influence upon the present and future status of both pupil and teacher it is intensely practical.—*Kindergarten Mag.*

THE EXISTENCE OF SPECIFIC CURATIVE SUBSTANCES IN THE BLOOD-SERUM OF TYPHOID AND CHOLERA CONVALESCENTS.

By Wm. Hallock Park, M.D.

Recent studies, by Pfeiffer and Kolle, upon the specific immunizing substances developed in the blood by an attack of typhoid fever or cholera are of great interest, since they indicate that in these diseases nature limits disease not through the development of antitoxins, as in diphtheria and tetanus, but through the development of specific bactericidal substances. They found this opinion upon the results obtained from a long series of careful experiments.

Thus they found that if a moderate-sized platinum loopful of a virulent typhoid culture of twenty hours' growth is mixed with a cubic centimetre of sterile salt solution or bouillon, and injected into the peritoneal cavity of a young guinea-pig (300 grs.), the bacilli will be found to rapidly increase in numbers, and in the peritoneal cavity a bloody exudate will be thrown out if the disease is rapidly fatal, or a more purulent one if the disease is less acute.

Death takes place, according to the virulence of the culture and the number of bacteria injected, in from six hours to several days. In the more acute cases the bacilli continue to increase in numbers until death, while in the more chronic ones, after increasing for a number of hours, they cease to develop and gradually diminish. In either case death is due, according to Pfeiffer, to the poisons produced by the breaking up of the bacterial bodies and not to poisons excreted by them while living.

If now other animals are injected with the same quantities of bacilli, to which normal human blood-serum is added in small and large amounts, it will be found that those receiving the culture, with the addition of small quantities of serum, die as those receiving no serum, while those receiving large amounts of serum are protected, normal blood-serum having, as is well known, feeble bactericidal properties Finally, instead of normal serum, much smaller amounts of serum from those recently convalescent from typhoid fever were added to the same quantities of virulent bacilli as in the former experiments and similarly injected

The behavior of the bacteria in the peritoneal cavity was in these very interesting. Thus, if tiny quantities of the peritoneal contents were taken after the injection of the mixture of the serum of convalescent patients and typhoid bacilli, it was found that almost immediately the bacilli began to lose their motility, and within fifteen to twenty minutes many of them showed signs of beginning degeneration The total destruction of the bacilli soon followed.

The quick death of the bacilli was also shown by making cultures every few minutes from the peritoneal contents. Thus one loop of peritoneal fluid, removed thirty minutes after the injection, contained between four and five thousand living bacilli. The same amount thirty minutes later but five hundred, and three hours later but twenty. When sufficient serum is used all the bacilli died as a rule within sixty minutes. If the animals were killed no living typhoid bacilli were found in peritoneum, blood, or organs. If the amount of serum is too small after the bacilli have diminished somewhat in number they will again increase, and this increase will continue until the death of the animal.

This serum, which possessed such marked bactericidal effect upon the typhoid bacilli when injected into the peritoneal cavity with the bacilli, was found in the test-tubes to possess very feeble bactericidal power, and, indeed, by heating it to 60° C., it could be robbed of its bactericidal power in the test-tube completely without diminishing to any appreciable extent its power when injected into the body.

The specific nature of the substance was shown in that, while acting so powerfully on the typhoid bacilli, it was without action on other bacilli closely allied to it biologically. The serum has in the future, therefore, a probable use for diagnostic purposes. The experiments with the serum of animals, immunized to the typhoid bacilli, gave similar results to those obtained from the serum of convalescent patients With cholera the results obtained were almost identical

From their experiments they conclude that the serum of typhoid and cholera patients contain substances which have a bactericidal and solvent effect in the body upon the bacteria of these diseases These substances do not exert their effect outside of the body, where they are in an active state

An antitoxin is not present in the serum. Normal human serum possesses feeble general bactericidal properties which affect typhoid and cholera as all other bacteria, and is in no way specific. The serum from typhoid and cholera convalescents is not only in its bactericidal power from twenty to one hundred times stronger than normal serum, but is also specific; typhoid serum being bactericidal only to typhoid bacilli, and serum to cholera spirilla.

This specific bactericidal substance in the blood of typhoid and cholera convalescents and immunized animals, is an added argument for the specific nature of these bacilli. The bactericidal substance in the serum of animals treated by increasing doses of the living virulent typhoid bacilli or cholera spirilla has not yet been obtained in sufficient concentration to make its use in the treatment of human disease seem advisable.

The results above summarized are of great importance if true, and they seem to be founded on very careful and repeated experiments. They indicate that we can only hope to find antitoxins, such as have been discovered in diphtheria and tetanus, in a few diseases. In the majority we must seek in other directions to find the means of prevention and cure substances. To a certain extent this is discouraging.

Their results also teach us to be cautious in using the various so-called antitoxins now put on the market for the treatment of almost all diseases due to bacteria. The majority of these substances certainly have none of the properties to which they lay claim.—*Med. News.*

MILK AS AN AGENCY IN THE CONVEYANCE OF DISEASE.

By Rowland Godfrey Freeman, M.D.

During the past twenty-five years a large amount of evidence has accumulated about the causation of disease by milk, and many cases of illness and many epidemics caused by contaminated milk have been reported. It has thus seemed desirable to consider, as far as possible in a short paper, the conditions under which milk can become the means for the conveyance of infectious agents; to bring together and tabulate the recent epidemics of disease which have been attributed to milk, and, finally, to draw certain conclusions as to the methods which should be adopted to avoid such disease-producing contamination of milk.

In inducing these diseases milk has served merely as the vehicle in which the micro organisms producing the disease have been transported. In order to show clearly how the micro-organisms enter the milk, and why so much disease has been caused by milk, it may be well to look into the milk traffic and the methods employed in expressing the milk from the udder of the cow and the subsequent manipulation and delivery to the consumer.

MAGNITUDE OF THE MILK TRAFFIC.

The amount of milk produced, transported, and sold is very large. Great Britain consumes 250,000,000 gallons a year which cost £17,000,000 or $85,000,000. The United States consumes 5,000,000,000 gallons a year. One may gain a more accurate conception of this latter amount by considering that it is nearly equal to the amount of Croton water consumed in New York City in one month. New York City consumes more than 7,000,000 gallons a year, an amount that would more than one-third fill the Bryant Park reservoir.

THE CONSUMERS OF MILK.

Milk is consumed largely by infants and invalids, for many of whom it is the exclusive article of diet. It is, moreover, usually taken uncooked, either from indifference or on account of the altered taste of cooked milk. This particularly susceptible portion of the community is thus less protected than the robust adult people, who use for the most part food that has been more or less sterilized by cooking. The desirability then of great care in the handling of milk is evident.

SOURCES OF CONTAMINATION OF MILK.

Milk as it exists in the udder of a healthy cow is germ free, that is, it is practically sterile.

But in fact milk as it comes to the consumer does contain a large number of living germs. These enter the milk in dirt, in dust, and in dirty water in various ways, and increase as rapidly as time and temperature allow. It is unfortunate that milk must be drawn from a hair-covered udder on the under surface of a hair-covered cow.

This part of the cow's hide retains particles of any dirt on which the cow may lie, as well as dried fæcal material, especially if the cow has loose evacuations. The droppings of dust and bacteria from the hide of cows during milking, even when the animals are kept fairly clean, are very great. Three Petri plates, three and one-half inches in diameter, containing a layer of sterile nutrient gelatin, were exposed for two minutes each on a gentleman's farm near New York. One was exposed out of doors, a second in the barn, and a third under a cow just in front of the milk-pail during milking. Subsequent examination showed that the plate exposed out of doors received six bacteria, while that exposed in the barn received 111 bacteria, and that exposed under the cow received 1800 bacteria. If 1800 bacteria will fall from the belly of a cow during milking in a circle three and one-half inches in diameter in two minutes, one can easily appreciate the immense number that will fall into an ordinary milk-pail during the whole period of milking. This, however, is only one of the sources of contamination. The milkman, wearing clothes from which much dust falls, leans forward over the pail, his arms especially being shaken over the pail. The friction between the milkman's hands and the teats of the cow causes the removal of the dirt and epithelium from both the hands of the milkman and the teats of the cow. This friction is often lessened by what is known as wet milking. When this is practised, a stream of milk from the teat is directed against the palms of the milkman's hands, first one hand and then the other, the hands being then applied to the teats. The result is that the teats of the cow and the palms of the hand of the milkman are practically washed over the milk-pail and drops of milk expressed from between the hand and the teat fall into the pail below. A less important but still material source of contamination is the dust of the barn. It is seen that while only six bacteria fell into the plate out of doors, 111 fell during the same time in the barn

Contamination of milk by impure water is of frequent occurrence. Such water is often used in washing the pails, or it may be introduced into the milk by submersion of the milk in pails or cans in contaminated water for cooling. Or adulteration of milk with dirty water may occur. The quality of the water used in many dairies has apparently received little attention.

It is thus seen that during and immediately after milking, an extensive contamination of the milk takes place, and by no practicable method yet adopted has it been possible to entirely prevent it. Fresh milk appears to have some germicidal action. The writer has found a constant diminution in the number of bacteria in certain specimens of milk during the first twelve hours after milking. Fokker has reported similar results, noting a diminution in the number of bacteria during the twenty-four hours after milking. Such germicidal action of milk, however, cannot be depended on, for milk will sometimes sour within twenty-four hours after milking. It is, therefore, desirable that milk should be kept cold and consumed or sterilized within twenty-four hours after milking. The influence of temperature on the growth of bacteria in milk was well shown by the following experiment: From a specimen of milk a certain amount was put in four sterilized test-tubes. These samples were left for twenty-four hours at different temperatures. At the end of twenty-four hours a fixed amount from each sample was planted in a plate and the number of colonies that developed in each plate was counted. The one kept at 7° C. (45° F.) had 445 colonies; that at 10° C. (50° F.) 1362 colonies; that at 13° C. (55° F.) 67,170 colonies; while the one at 20° C. (68° F.) showed 134,340 colonies. Such experiments show that milk should be kept at a temperature below 10° C. (50° F.) until sterilized or consumed. It has been stated already that milk should not be kept raw for more than twenty-four hours. New York milk, even that of the better sort which is brought to town in bottles and sold at eight or ten cents a quart, is usually thirty-six or forty-eight hours old when delivered to the consumer. Some milk shipped to

New York from a distance of over three hundred miles is actually nearly twenty-four hours old when shipped. The transportation of milk is by milk trains, which are very slow, often making only seventeen miles an hour.

A consideration of the foregoing statement prepares one for the results of the examination of ordinary New York milk, which often contains from a hundred thousand to several million bacteria in each drop. Our present dairy methods allow ample opportunity for the entrance of bacteria, either non-pathogenic or even pathogenic, should the latter sort be present. The long interval between milking the cow and delivering the milk to the consumer allows ample opportunity for the bacteria to multiply.

DISEASE CONVEYED BY MILK

The diseases which, it is believed, may be conveyed by milk are conveniently divided into three classes:

I. Those in which the pathogenic micro organisms which are introduced into the milk are conveyed from the body of the diseased cow, as tuberculosis, anthrax, foot-and-mouth disease, and acute enteritis.

II. Those in which the pathogenic micro-organisms are introduced into the milk from some other source either during or after milking, as cholera, typhoid fever, scarlet fever, and diphtheria

III. Those caused by milk which contains poisonous agents developed by bacterial growth.

A STUDY OF THESE EPIDEMICS TEACHES US

1. Whenever a case of communicable infectious disease is reported inquiry into the source of the milk-supply should be made.

2. Milk traffic should be separated from houses where people live. The dairy building should be at least one hundred feet from either the house, barn, or privy, and should be on a higher level than either of these, and should have a pure water-supply of its own. At this dairy building all the dairy work should be done, including the cleansing of pails and cans.

3. It should be unlawful for any one who has come in contact with a sick person (when this sickness is not positively known to be non-contagious) to enter the dairy building or barn or to handle the milk.

4. All men connected with the milk traffic should be compelled to notify the authorities on the outbreak of any disease in their respective abodes, and to abstain from their work until permission to resume is given them by the authorities notified.

5. Cities should accept milk only from dairies which are regularly inspected and where all the cows have been tested with tuberculin and those giving the characteristic reaction have been killed and the premises disinfected.

9. The tuberculin test should be applied to all cattle and those which react should be killed, the owner being reimbursed from State funds. The premises on which such tuberculous cattle have been kept should be thoroughly disinfected. All cattle which are brought into the State should be quarantined until the tuberculin test has been applied.

7 The use of one long trough for the purpose of feeding many cattle should be avoided, since it is a ready means for the conveyance of pathogenic germs from one animal to another.

From the excellent regulations of the New York City Board of Health for the sale and care of milk I take the following important rule: "Milk shall not be kept for sale or stored in any room used for sleeping or domestic purposes or opening into the same

Undoubtedly the adoption of the above regulations would do much in reducing the amount of sickness due to the conveyance of pathogenic organisms by milk. It does not seem probable, however, that any regulations can entirely eliminate this danger.

I would, therefore, add one word of caution for physicians who order milk diet: Use some sufficient sterilizing process, so that in case the milk supplied contains pathogenic organisms, they may be destroyed before the milk is used by the patient.—*Abstract N. Y. Med. Rec.*, Mar. 28, '96.

SANITARY CONDITION OF PUBLIC SCHOOLS.

THERE is a growing conviction in this community that crowded and unsanitary public schools contribute unduly to the spread of infectious diseases and to our high mortality rates; and the recent organization by the Boston Board of Health of a system of daily medical inspection of the public schools is likely to stimulate imitation and may lead to far-reaching results. Recent developments in Boston point to the need of a more thorough-going, intelligent, and responsible supervision of schools and scholars by experts in sanitation and hygiene, in order that the taxpayers may have a fair return on the money expended in providing the rising generation with school houses, teachers, and educational appliances.

General interest attaches in an unusual degree to two reports made to the mayor * during the past week, concerning undoubted defects in certain Boston school-houses in respect to ventilation, sanitation, and janitorial care. Full abstracts of these reports have appeared in the daily papers, to which our readers are referred for details. The first report—reprinted as City Document, No. 74, 1896—is particularly worthy of careful perusal by the profession. It was prepared by a commission consisting of Mr. F. W. Chandler, Professor of Architecture in the Institute of Technology; Mr. Frederic Tudor, sanitary engineer, and Mr. S. H. Woodbridge, Instructor in Ventilation and Heating in the Institute of Technology. These gentlemen were appointed by Mayor Quincy soon after his inauguration to examine particularly into the sanitary condition of certain school-houses, for the repair of which the school committee had asked an extraordinary appropriation of $440,000. The second report is by a committtee of ladies representing the Boston Branch of the Association of Collegiate Alumnæ. It embodies the result of an elaborate statistical inquiry, which was begun before the appointment of the mayor's commission. The two reports reinforce each other. They are calculated to quicken the interest of the general and educational public, as well as that of the medical profession in the subject of school hygiene, and to raise questions as to the responsibility in the present untoward condition of the schools.

The facts set forth in these reports are of such a nature that Mayor Quincy's action in "urgently" recommending the city council to appropriate the sum of $300,000 "at once," to be expended "in making a beginning towards putting the school-houses of the city in a proper condition as regards ventilation and sanitation" seems to be fully warranted and to deserve the hearty support of both the profession and the public.

Lack of space forbids anything like a detailed summary of the interesting reports referred to above; but in general it may be said that the mayor's commission finds: that the "defects of the school-houses are chiefly those of principle; the workmanship as a rule, excepting the buildings most complained of, being above the average found in private houses;" that the "health department has been most diligent in its inspections . . . unremitting in its exertions to have this subject taken up, with a sincere intention to carry out reforms long regarded as imperative and not proper to be put off for a single day;" that there is need of a more intelligent and efficient janitorial service; that radical improvements in the matter of fire-escapes are called for; and that the present system of administration in regard to the erection, repair, and inspection of school-houses is ill-organized, confused, and ineffectual. The report of the collegiate alumnæ, in addition, lays special stress on the unwashed floors of the school-houses and on the large number of unoccupied seats.

We have touched on only a few of the most salient facts brought out in these reports; but the facts alluded to suggest certain questions which seem pertinent. Why has the school board allowed or been forced to allow the school-houses to get into their present state? Who is responsible for the

---

* Boston. What is said of the schools of Boston would aptly be said of those of almost every city in America.

present lax and unsatisfactory methods in planning, building, and repairing the schoolhouses? Why should it be necessary for a volunteer committee of lay-women to institute an elaborate investigation into the sanitary and hygienic conditions surrounding teachers and pupils—when the city maintains an active and alert health department, a highly paid superintendent of public buildings, and a sub-committee of the school board charged with the general supervision of hygiene in all the schools?—*Bost. Med. and Surg Jour*

REGULATIONS REGARDING THE ISOLATION OF CASES OF DIPHTHERIA IN PRIVATE HOUSES BY THE HEALTH DEPARTMENT.

In private houses the duration of isolation of cases of diphtheria after apparent complete convalescence of such cases shall be determined by the physician in attendance, with the following conditions:

1st. Children convalescent from diphtheria shall not be allowed under any conditions to attend any kind of school, *i e*, day school Sunday-school, dancing-school, etc, until cultures show the absence of diphtheria bacilli in the throat

2d Circulars of information regarding the persistence of virulent diphtheria bacilli in the throats of convalescent cases of diphtheria and the dangers from infection arising from such cases shall be furnished by the Health Department and presented by the attending physician (if the patient is a child) to the mother, father or guardian, or if the patient is an adult, to the patient, and the meaning of the circular and the significance of its contents explained to them

3d The attending physician when continued isolation is not maintained shall immediately notify in writing the Chief Inspector of Contagious Diseases of the Health Department of his action and disinfection of the premises may then be performed by the Health Department

Exceptions to this rule regarding the time of isolation of convalescent cases of diphtheria in private houses shall be: (1) Teachers of all kinds (2). Persons whose occupations bring them into immediate contact with children. The regulations of the Health Department regarding isolation of cases of diphtheria in boarding-houses, apartment-houses, hotels, and tenement-houses heretofore observed shall be continued [Signed] GEORGE B FOWLER, M.D, *Commissioner of Health* By order of the Board of Health. CHARLES G. WILSON, *President*, EMMONS CLARK, *Secretary*.

ELSNER'S READY METHOD OF RECOGNIZING THE TYPHOID BACILLUS.

In the *Zeitschrift fur Hygiene* Bd xxi., 1895. p 25, Elsner describes this method, to which reference has already been made in these columns: Ordinary gelatin is cooked with an infusion of potato (500 grams to the litre of water), and to this is added enough normal sodium solution to give a slight acid reaction, according to the method of Holz. It is then filtered and sterilized When it is to be used, one per cent. of iodide of potassium is added, the mixture being then inoculated and plates made Elsner has examined by the aid of this medium surface water, soil etc., and when colon bacilli were present they grew with almost entire exclusion of other bacteria. The proteus and root bacillus, which he found grew readily on media containing carbolic acid, only occasionally grew at all on the new culture medium and then were placed in the background by the colon bacilli The colonies of colon bacilli show the characteristics which are present when they grow on any acid medium The typhoid bacillus grows characteristically so as to be readily distinguishd from the colon On the iodide-of-potassium potato-gelatin in twenty-four hours the typhoid-bacillus colonies are almost invisible under a moderate magnifying power, while the colon-bacillus colonies appear well grown out; in forty-eight hours the typhoid colonies appear as small clear, shining, drop-like, finely granular growths, while the colonies of the colon bacillus are large, much more coarsely granular, and brownish. He has tested thirty different cultures of colon and typhoid bacilli, as isolated upon this culture material, by Pfeiffer's method (*i.e*, the use of the specific property of the blood-serum from typhoid-immunized animals), and in every case the identification was shown to be correct. In one instance a bacillus which was not distinguishable from the typhoid bacillus by ordinary culture methods was found, upon the use of the iodide-of-potassium-potato-gelatin plates, and also by Pfeiffer's method, to be a variety of colon bacillus. The typhoid bacilli could be readily detected, even if very few in numbers. By the use of this method, typhoid bacilli were isolated from the evacuations of fifteen out of seventeen cases of typhoid fever; of the two other cases, one was in the seventh week, and defervescence had taken place in the second —*N. Y. Med. Rec.*

CIRCULAR OF INFORMATION REGARDING THE DANGER OF CASES OF DIPHTHERIA COMMUNICATING THE DISEASE TO OTHERS AFTER CONVALESCENCE.

DIPHTHERIA is due to a germ known as the diphtheria bacillus. This germ is present in the membrane and in the secretions of the mouth, nose, and throat of cases of diphtheria. The disease is only produced by the reception of these germs into the mouth or air-passages of other persons. The discharges from the nose and throat of cases of diphtheria containing these germs may be received on handkerchiefs, towels, bed-clothing, carpets, rugs, personal clothing, toys, books, etc., dry, become pulverized and breathed in as dust, or they may be transmitted directly from the sick to the well through personal contact, as in the use of drinking-cups or eating utensils which have been employed by the sick, or through kissing the sick, or through the direct discharge of the secretions on the hands or face or clothing of the nurse or physician in attendance, in making applications to the nose or throat of the sick person. Thus, in numerous ways the germs find their way from the throat of the sick to the mouth or air-passages of the well, and if then the conditions are favorable for the development of diphtheria in the throat of the person receiving them, after a varying period the disease is produced. Diphtheria only follows the reception of the germs in the throat if favorable conditions for their growth exist there. In many cases the germs remain for many days and increase in number in the throats of healthy persons who have been in contact with cases of diphtheria without producing the disease. Well persons who have these germs in their throats may convey them to others, who contract the disease while they themselves escape. During convalescence from diphtheria the germs of this disease often persist in the throat for many days after all signs of disease in the throat have disappeared, and after the individual is entirely well. Investigations show that in about thirty per cent. of cases they persist for three weeks or longer after the beginning of the disease; in fifteen per cent. for four weeks or longer, in five per cent. for five weeks, and occasionally even for a much longer time. Experiments have shown that almost invariably these germs are virulent and capable of inducing the disease in others, so long as they persist in the throat, and persons having such germs in their throat may convey the disease to well persons at any time. Observation, however, has proven that the chances of communication of the disease to well persons after complete convalescence are not great, excepting among children, who are far more susceptible to the disease, and who are much more likely to become infected through the frequent introduction of articles into the mouth. The danger of communicating the disease to others after recovery is less than during the disease, because the number of germs is smaller, and because the secretions are less abundant and not likely to be discharged so that they would be received by other persons. Where persons do not remain completely isolated, as they are strongly advised to do, until cultures made from the throat show the absence of the diphtheria bacilli, they should constantly remember the facts set forth in this circular, and use every precaution to prevent the communication of the disease to other persons, and should be particularly careful in their relation and contact with children. Under no conditions will children whose throat secretions still show the presence of diphtheria bacilli be allowed to attend school of any kind, and under no conditions will adults be allowed to return to their occupation, where this involves immediate contact with children. [Signed] GEORGE B FOWLER, M.D., *Commissioner of Health.* By order of the Board of Health CHARLES G WILSON *President;* EMMONS CLARK. *Secretary.*

KITASATO'S EXPERIENCE WITH ANTITOXIN OF DIPHTHERIA IN TOKIO.

DR. KITASATO has just published a detailed report of 353 cases treated at the institute with the serum prepared under his supervision. For those who have no access to the original a few brief extracts may be of some interest. *Mortality:* Professor Kitasato collected from reliable sources 26,561 cases of diphtheria in Japan previously to serum-therapy, with 14,996 deaths (56 per cent.); while of 353 cases treated here from November 13, 1894, to November 25, 1895, there were only 31 deaths (8.78 per cent.). There is reason to believe that the mortality can still be lowered if the treatment could be commenced early in the course of the disease. Thus in 110 cases in which injections were made within forty-eight hours after the invasion, all ended in recovery. On the other hand, of 33 cases treated after the eighth day of the disease 11 were lost. Some of the patients were brought into the institute in a moribund condition, and six children died within five hours after admission, six more within ten hours: altogether 21 cases (two-thirds of the total mortality) were lost within the first twenty-four hours. As to the effect of the serum on the course of the disease the first thing to be noted is (*a*) the fall of temperature: in many cases the defervescence was almost critical, and it takes place usually at the end of twenty-four to forty-eight hours. Secondly, (*b*) the separation of the false membrane, which takes place, as a rule, after the return of the temperature towards the normal. Very large casts of the trachea and larger bronchi have been coughed up (*c*) Urticaria like eruptions were observed in very many cases being in some quite severe and annoying. They, however, disappeared in a few days without any treatment. (*d*) In four cases marked albuminuria was observed at the time of admission. In these cases albumin disappeared from the urine in the course of treatment. Pyrexia was accompanied by albumin in the urine, but there was no reason to believe that any renal trouble was caused by the injections. (*e*) Five cases developed paresis of the soft palate. I wish to note, in conclusion, that microscopic as well as culture examinations were made in every case, and Dr. Kitasato's report only deals with those cases in which Löffler's bacilli were demonstrated to be present —*Dr A. Nakagawa in the Lancet.*

LEPROSY IN THE UNITED STATES AND BRITISH PROVINCES.

ANOTHER leper, this time an American-born and 54 years of age, has joined the colony at North Brother Island, New York City. He applied for treatment of a skin disease at the Presbyterian Hospital clinic, where leprosy was promptly diagnosed. He had resided in New York for sixteen years, and for a long time was a sea-going cook. The colony above referred to consists now of a negro, a Chinaman, an Italian, and this American. Along with this announcement by the lay press of March 5 came recent government reports from Canada, which state that leprosy is increasing in New Brunswick and Nova Scotia. There are now a number of cases of leprosy in Cape Breton, N. B., and others scattered all over the province. There is one district in New

Brunswick, Port Hood. where it has existed for years among the poor fishing settlements. Tradition traces it back to a French vessel, *L Indienne*, which had been trading in the Levant and was wrecked at the mouth of the Miramicton River in 1758. It is said that she had on board some Lascar or other Oriental sailors who were lepers Clothing belonging to some of these men was distributed among the fishermen. The wreck took place in the fall, and the crew associated with the fishermen all winter Since then leprosy in a dormant way has been present among the French settlers in this region. When the Acadians were expelled by the English in 1765 and were removed to Louisiana it is said that cases of leprosy were taken with them, for there have always from that date been cases of leprosy in the neighborhood of New Orleans, and a leper hospital was established to care for those afflicted only a few years later, in 1785: but this hospital has been discontinued. In Nova Scotia there have been a few cases of leprosy, but confined to the families of certain Scotch and Irish settlers.

A Norwegian colony in Minnesota and the leper hospital in San Francisco since 1871 show, to say the least, that the Western Hemisphere is not without its opportunities for special study. The fact that the spread of leprosy is slow, and in some countries seems to have ceased, better enables us to trace the course of its dissemination and the conditions of its environments. Thus far it is an importation, or at least carries a foreign stamp. In countries where the spread is rapid it is believed to be both contagious and hereditary, but probably the observation is from the numerical standpoint alone. Therefore our great sister city has or is likely yet to have many opportunities for a study in miniature. But with the growth of personal liberty and the loose methods of charitable institutions there cannot well be many advances along the line of isolation or segregation. Meanwhile the Leprosy Investigating Committee of England, under the patronage of the Prince of Wales, has also with its Indian connection a wide field. This organization, it will be remembered, had its birth in the promotion of a memorial for Father Damien, a self-sacrificing sceptic to the doctrine of contagion, and to the fact that a leper had been found handling fresh meat in a London market.—*Jour. Am. Med. Ass'n.*

A BLUE BLOOD-CORPUSCLE.

"Hamlet's Aunt," in "David Copperfield," like many worthy folks, has a pronounced taste for Blood (with a large B). "We see Blood," she says, in an enthusiasm worthy of the subject, "in a nose and we know it. We meet with it in the chin, and we say 'There it is. That's Blood!'" It would be flippant to suggest that in the latter case at least the true inwardness of the phenomenon might be a bad razor. As regards the other situation, the lady would have rejoiced had she foreseen that the day would come when Blood could be known for what it is, even outside the proudly arched nose of its patrician owner. Hitherto noble blood could only be recognized as Falstaff knew the Prince—"by instinct," though sometimes physicians may have been tempted to think that its cerulean tint might be due to the accumulated impurities of generations of diseased ancestors. Now at last, if report is to be trusted, a special character has been discovered by which Blood can readily be identified with the microscope. Oddly enough it has been reserved for a citizen of that great country "across the faem," where one man's blood is theoretically as good as another's, to make this interesting discovery. We read in the *Medical News* that a Philadelphia physician who comes of "a good old stock," has satisfied himself as to the existence of "a distinct and separate corpuscle of blue blood." The doctor, it is added, has made the discovery, "by experiments upon his own person,' a circumstance which may perhaps somewhat discount its importance in the eyes of the effete aristocracies of Europe. Still, the corpuscle might have a distinct sphere of usefulness as a kind of guarantee that its possessor could be "known," or even "called upon," without fear of social contamination. An exchange or mutual exhibition of "slides" might make it possible for Englishmen to speak to each other without being introduced. In the arrangement of marriages the corpuscles would perhaps occasionally be helpful, and it might be of some assistance to the Lord Chamberlain in deciding on the claims of persons anxious to be presented at Court. But before it is accepted as a Hall mark of gentle birth, or even of what Carlyle called "gigmanity," it is essential that the morphology and life history of the new "cyanohematocyte" should be fully worked out. We await with respectful interest further details from the City of Brotherly Love.—*Brit. Med. Jour.*

BICYCLE-RIDING.

THE wheel is often the primary or exciting cause of serious rectal troubles, and I cannot think of any affection of the rectum that it will not aggravate. I have seen several cases of fissure, external piles, and pruritis ani, where riding ceased to be a pleasure, and in two where it could not be tolerated. Many of the simpler troubles will disappear when the wheel is discarded for awhile; others of a more serious nature will need surgical treatment.

In attacks of acute diarrhœa, where the anus is excoriated from watery evacuations, and the rectal mucous membrane congested and often inflamed, the bicycle adds more fuel to the flame, and is often the direct cause of a fissure, rectal ulcer, or internal hemorrhoids : while on the other hand the friction from the saddle produces an excoriation about the anus, and defecation acts as an exciting cause to produce the same affections. which when once fully developed demand nothing short of surgical interference and discontinuance of bicycling. [The above ill effects in the class of cases mentioned are always much aggravated, perhaps chiefly caused, by one of the hundreds of miserable ill-formed saddles and by concussion of the perineum due to jolting and vibration.—ED]—*Doctor Blackburn in Louisville Medical Monthly.*

THE TREATMENT OF SCARLATINA WITH ANTI-STREPTOCOCCOUS SERUM.

MARMOREK (*Annales de l'Institut Pasteur*, 1896, No. 1, p. 1) details the results achieved in the treatment with anti-streptococcous serum, of ninety-six cases of scarlatina at the Hôpital Trousseau from October 16 to December 31, 1895. Seven additional cases coming under observation during this time were not treated with the serum because of the lateness of the disease. One of these presented a nephritis of three weeks' standing and remained under observation for two months without progressing to recovery. Two sisters of this child, who were attacked later, were treated with serum and recovered without complication. In all of the ninety-six cases streptococci were found, alone or in association with other micro-organisms. In seventeen cases diphtheria-bacilli were present. Four of these presented symptoms of diphtheritic intoxication and died, notwithstanding treatment with both the anti-streptococcous and the anti-diphtheritic serum. These children had been several days without treatment. One other child died as a result of bilateral pneumonia. All of the children received at first a dose of 10 c.c. of the serum. The dose was doubled if the general condition appeared grave. In addition only antiseptic lavage of the throat was employed. The injections were repeated daily until the temperature became normal. Ordinarily two injections proved sufficient When complications, such as adenitis, otitis, or albuminuria appeared, the injections were resumed, and continued until the normal condition was restored. No bad effects were observed from the use of the serum. It influenced only the complications due to streptococci.—*Med. News.*

STUDY OF OSTEOMYELITIS WITH EXPERIMENTS TO IMMUNIZE.

A DETAILED report of sixty-three cases of this disease treated in the Moabit Hospital, at Berlin, is published in the *Deut. Ztschr. f. Chir.*, vol. xlii., p 135. It shows again the fact that it seems to be a disease peculiar to youth, as the patients were under 21 years of age. Three cases were accompanied by periostitis albuminosa, and numerous staphylococci were found in the exudations after lancing, thus showing that there is really no difference between this form and the suppurative. Nineteen cases followed an accident and one case a severe wetting. Other cases were preceded by angina, typhoid fever, scarlet fever, a suppurating wound, an ulcus cruris and a carious tooth, one of each. The rest of the cases were what is called primary. Most were treated by opening and draining the abscesses, and the few that were scraped required amputation afterward. The pus was examined in twenty-six cases, and streptococci and staphylococci were found together in seven, diplococci in one, but staphylococci were in all except two, so that this disease can be considered a staphylococci pyæmia of the period of development. Experiments on forty young rabbits with injections of staphylococcus bouillon cultures in the auricular veins produced suppurative inflammations of the marrow and joints, all containing staphylococci. Injections of streptococci also produced typical osteomyelitis, but staphylococci introduced into the stomach were innocuous. Other animals were immunized with serum from patients, and resisted all attempts to produce the disease, although the data are as yet insufficient to accept this as an absolute certainty.—*Jour. Am. Med. Ass'n*

◆

THE HYGIENIC AND SCIENTIFIC VALUE OF THE EYES AND EARS OF SCHOOL-CHILDREN.*

ALTHOUGH the requirements of school life have steadily increased during recent years, the author thinks that the damage of overcrowding the pupils has materially decreased, owing largely to the better hygienic conditions of school-buildings. More sweeping application of the rules generally accepted as requisite is also needful to place this aspect of the matter in fairly satisfactory shape.

Forced into rather wholesale dealing with their scholars by large classes and the pressure of changing methods of instruction, the teachers, as a class, are yet sedulously careful of the health of their pupils, and often nobly self-sacrificing in their efforts to save them from any injury in the educational process.

All the requirements of sanitary science were skilfully carried out in school-buildings, yet there would be some children who could not follow the course of instruction without grave injury. The writer believes that every child should be examined by an ophthalmic expert to the end that these weaklings may be excluded from the school and saved from consequences worse than loss of education. Doubtful cases could be watched and early warning sent to the parent of the need of medical care. The doctor points out the advantage of this system over waiting till errors of sight become evident by the inconvenience they cause. It is suggested that competent physicians would be willing to do this work instead of caring for hospitals or dispensaries, much to the advantage of the general community.—*Arch. of Ped*

◆

THE HYGIENIC IMPORTANCE OF LIGHT*

ASIDE from its influence in other directions, light has a very important action as a disinfectant, as is shown by W. Kruse. It has a destructive influence on living bacteria, the intensity of its action being dependent on the amount of oxygen present. With increased intensity of light comes increased disinfecting power It does not act thus by reason of any heating influence, although the effect is greater the higher the temperature. The greater the relative number of bacteria, the slower appears the action of the light to which they are exposed; and the medium in which they exist has considerable influence on the result. Liquid media containing complex nitrogenous substances are so altered by the influence of light that they take on antiseptic properties against the bacteria. This change ensues under the influence of the atmospheric oxygen, and is manifest so much the more according to the intensity of the light and duration of exposure.—*Arch. of Ped.*

---

* Alexander B Randall in *Journal of American Medical Association*, 1895, vol. xxv., No. 10.

* *American Journal of the Medical Sciences*, 1895, vol. cx., No. 28.

DISINFECTION OF THE MOUTH IN SCARLATINA.

At the Société des Hôpitaux, in Paris, M. Lemoine recently advanced the theory that the period of contagion in scarlatina is at the beginning rather than at the close of the disease.

He regards the secretions of the mouth and pharynx as the dangerous elements rather than the desquamating epithelium, and considers that the disinfection of these cavities should take first rank among prophylactic measures, and that the period of isolation to which cases of scarlatina are at present subjected should be considerably shortened.

This view is important, in that other eruptive diseases, as measles and small-pox, may perhaps be transmitted by the same means.

Until the pathology of these diseases is better known, it seems rational treatment to disinfect the mouth and pharynx, thus possibly rendering a service both to the patient and to the attendants.—*Am. M.-S. Bull.*, 1896, ix., 150.

A TYPHOID EPIDEMIC EXPLAINED.

There has been in Duluth, according to the *New York Polyclinic*, an epidemic of about 1000 cases of typhoid fever, with 30 deaths, caused, it is believed, by the infection of the water. An inquiry disclosed the fact that the intake of the water company in the adjoining great lake was only 359 feet from the shore, was in a filthy condition, and was situated about 800 feet from the mouth of a large sewer. It appears that the superintendent himself has for a year or two procured water for his family from a spring several miles from Duluth. The city now compels the company to supply spring-water to consumers without additional cost. The supply is said to be abundant and the quality of the water pure and excellent.—*Bost. Med.-Surg. Jour.*

A REMEDY FOR BLACK EYE.

There is nothing to compare with the tincture or strong infusion of capsicum annuum mixed with an equal bulk of mucilage or gum arabic with the addition of a few drops of glycerin. This should be painted over the bruised surface with a camel's-hair pencil and allowed to dry on, a second or third coating being applied as soon as the first is dry. If this is done as soon as the injury is inflicted, it will invariably prevent blackening of the bruised tissue. The same remedy has no equal in rheumatic sore or stiff neck.—*Medical Progress.*

FOREIGN BODIES IN THROAT.

The difficulty of removing fish-bones and similar obstructions impacted at the lower end of the œsophagus is well known, and various mechanical measures and appliances have been invented to deal with the difficulty. One of the most simple, however, and, as reported, one of the most effectual, is to administer to the patient a pint of milk, and forty minutes afterwards an emetic of sulphate of zinc. The fluid easily passes the obstruction, and is, of course, rapidly coagulated in the stomach into a more or less solid mass, which, on being ejected, forces the obstruction before it and so effects its removal.—*Medical Times.*

AGAINST THE SPITTING NUISANCE.

The Health Board of St. Louis has recommended to the city council the adoption of an ordinance making it a misdemeanor for any person to expectorate on the floors of street-cars or other public conveyances, or in hotel corridors, theatres, public halls, and places of worship; also that the porters or persons in charge of the cars and public places be required to furnish cuspidors in sufficient number, and that they be required to clean the vessels daily, using some disinfecting fluid to be approved by the Board of Health, also that suitable provisions be made for the inspection of the vessels and the public places where they are provided. —*N. Y. Med. Rec.*

NO SPITTING IN STREET-CARS.

Hereafter the following sign is to be posted in all the passenger-cars of this city (New York):

"Health Department,
"New York City.

"Spitting on the floors of public conveyances is a nuisance, is frequently a means of communicating disease, and is hereby forbidden.

"By order of the Board of Health.
"Charles G. Wilson, *President.*
"Emmons Clark, *Secretary.*"

President Wilson suggested that if the signs do not stop the practice, an ordinance be passed authorizing the company to call a policeman and have the offender put off whenever he violates the rule.—*N. Y. Med. Rec.*

THE SERUM TREATMENT OF SNAKE-BITE.

The serum prepared by M. Calmette at the Pasteur Institute in Paris for the treatment of snake-bite has been successfully used at Agra, India, in the treatment of a native bitten by a cobra. A number of sheep poisoned by snake venom were also saved by the use of serum.—*Bost. Med.-Surg. Jour.*

MILK FILTERED THROUGH COTTON.

Dr. Seibert, of New York, has made a number of experiments with milk filtered through cotton. He finds that while the greater part of the germs are eliminated no cream is lost. Plain milk showed from thirty-eight hundred to two hundred thousand germs, while the same milk filtered showed about one-fourth that number. If this is true, filtration is about as good as sterilization, and has an advantage in that sterilized milk is not so good a food as plain milk.—*Canadian Practitioner.*

A TRIAL OF CHOLERA INOCULATIONS.

During a recent cholera epidemic on the railway line from Assam to Burmah, one hundred and ninety-six workmen were inoculated after the method of Dr. Haffkine. Of these only four died, while of one hundred and fifty-nine who were not inoculated thirty died. [In this instance anticholeraic inoculation was about eight times more effective than the other preventive measures employed.]—*N. Y. Med. Rec.*

PROPHYLAXIS OF TUBERCULOSIS IN CATTLE IN FRANCE.

The *Bulletin of the Académie de Médecine* announces that the Minister of Agriculture proposes to inaugurate drastic measures in regard to the spread of tuberculosis among cattle in France. He is urging legislation to make the tuberculin test legal, and also remuneration to the owners of cattle killed after the test, of one-half or one-third of the value of the animal, with strict supervision of all the cattle imported into the country.—*Jour. Am. Med. Ass'n.*

Department of Physical Education.

WITH SPECIAL REGARD TO THE SYMMETRICAL DEVELOPMENT OF THE BODY.

Edited by J. CLARK SLAY, M.D.

(NEW YORK.)

PHYSICAL TRAINING.*

ITS AIMS, ITS METHODS, AND ITS WORK.

THE aims of physical training, as at present understood, may be included under four general heads: (1) Hygienic, (2) Educative, (3) Recreative, (4) Remedial. . . .

All games of skill and dexterity, all accomplishments, so-called, involve the training of the special senses and the brain and central nervous system, as much as they do the muscular system, consequently where the educative aims are pushed too far and the hygienic aims neglected, the individual draws heavily upon the same supply of nerve force which sustains him in his mental pursuits, and by thus burning the candle at both ends is likely to break down from nervous exhaustion. The familiar collapse that occurs to a certain class of men in training is an illustration in point. The aim should be in this case to maintain a proper balance between the mental and physical forces, which should be the object in view in practising recreative exercises.

The prominent part which recreative games, so called, are now playing in our systems of physical training leads us to ask just what recreation really means. Etymologically considered, "creation means a forming, and re-creation means forming anew; and when applied to the body recreation is simply a renovation of the vital energies." Recreation is therefore, or ought to be, not a pastime, entered upon merely for the sake of the pleasure which it affords, but an act of duty undertaken for the sake of the subsequent power which it generates and the subsequent profit which it insures. Recreation, therefore, may be defined as that which, with the least expenditure of time, renders the exhausted energies most fitted to resume their work. Assuming that the pursuit of knowledge and disciplining of the mind is the student's work, the vigor with which he returns to his task and the ease with which he accomplishes it, measures in a practical way the value of his recreation. . . .

THE REMEDIAL AIMS OF PHYSICAL TRAINING are usually comprehended in the efforts to restore disturbed functions and correct physical defects and deformities. Thus attempts are made to improve the respiration by strengthening the lungs, and adding to their volumetric capacity; to tone up the action of the heart, or allay its irritability, and improve the general circulation; and to aid the stomach in the performance of its office and assist the power of digestion. In aiming to improve the functional capacity of these important organs, the general nutrition of the whole body is increased and the individual is elevated to a higher plane of living. The strengthening of weak parts, the straightening of crooked limbs and curved spines, and the corrections of malformations of the chest and other acquired deformities are all included under the remedial aims of physical training.

---

* Abstract of a paper read before the Boston Society for Medical Improvement by D. A. Sargent, M.D. Published in the *Boston Medical and Surgical Journal* for February 20, 1896.

The means employed for effecting these different aims are many and various, but may be grouped in general terms under six heads: (1) Gymnastics, (2) Athletic Sports, (3) Plays and Games, (4) Free Movements, (5) Developing Appliances, (6) Medical Gymnastics and Massage.

Gymnastics, as now practised, may be divided into two groups—light gymnastics and heavy gymnastics. Under the head of light gymnastics are included such exercises as are performed with light pieces of portable apparatus which can be held in the hands, and moved around the body, such as dumb-bells, Indian clubs, wands, hand-rings, single sticks, balls, etc. Heavy gymnastics are usually included under the head of such exercises as are performed upon fixed or heavy appliances where the weight of the body is supported and made to move up and down or revolve about the apparatus by aid of the hands, arms, or legs. The appliances for these exercises are known as horizontal and parallel bars, ladders, vaulting horses, and suspended ropes, poles, rings, swings and trapeze bars, of numerous varieties and patterns. Under this head might also be grouped the formation of pyramids, and the different varieties of posturing and tumbling which are familiarly known by the term acrobatics.

The exercises which are now classified under the head of athletic sports comprise those which are peculiar to the race-course, or running-track, and those which are performed in the open field. In the former are included the various events in running, hurdling, and bicycling, and in the latter such exercises as jumping, pole-vaulting, weight-throwing, etc. If we include under the head of athletics all of the competitive exercises presided over by the Athletic Union, the list should be made to include boxing, wrestling, fencing, swimming, skating, etc.

In the popular mind, baseball, football, and rowing are included under the general term of athletics; but for educational purposes it is better to group baseball and football, with cricket, tennis, golf, and La-Crosse, under the head of games. As these games are played, however, at the present time, they are games of skill which (excepting golf) presuppose serious work or hard and careful preparatory training. There is an element wanting, especially for children or hard-worked students, that is found in another class of games which may be well termed plays.

The plays include the different forms of tag with which we are all familiar, the "scratch" races and impromptu contests of one kind or another like the old-fashioned football games, and the gymnastic games which are often introduced to relieve the monotony of routine work in the school-room, drill-hall, or gymnasium. The games of basket-ball, battle-ball, three-deep, over-the-line, pin-polo, hole-ball, and pass-ball were invented to serve this purpose.

Under the head of free movements are classified and taught a large variety of exercises which are done without apparatus. The milder forms of these exercises may be termed devitalizing or relaxing movements, calisthenics or æsthetic movements; and the severer forms, Swedish free movements, free exercises, various forms of dancing and dancing calisthenics.

The developing appliances with which most gymnasiums are now so well equipped consist of chest weights, chest expanders, quarter circles, inclined planes, rowing machines, etc., to the number of fifty or more. As the name implies, these different pieces of apparatus are used as a means of developing the different muscles of the body. The essential features of the developing appliances are a pulley contrivance which enables the instructor to prescribe resistance from any direction, and the capacity for adjustment which enables him to adapt the apparatus to the strength of the strong or the weakness of the weak. The adjustable features of this apparatus render it very serviceable in the treatment of delicate individuals, or what we term special cases.

The Zander machines constitute the outfit which is used most frequently in the hospitals and sanitariums of Europe in administering the so-called medical gymnastics. Many of these appliances are attached by belts to the fly-wheel of an engine, and all the patient has to do is to seat himself at the apparatus, and the steam-engine does the rest. By communicating to the system a succession of quick vibrations or oscillations, rapid tissue changes are produced, and the vital organs are often stimulated to greater activity.

As a powerful adjunct to be employed in connection with passive or resistive movements for various purposes we must class massage. The training of the gymnasium teacher is incomplete without a knowledge of this important art.

PRECAUTIONS TO BE OBSERVED IN PRESCRIBING PHYSICAL TRAINING.

In order that these several means or agencies for physical training may be beneficial they must be used judiciously and with some knowledge as to their physiological, therapeutical, and specific effects. All of the precautions that are necessary in prescribing other agents of the materia medica must be observed in administering those that I have mentioned.

The question of kind and combination of exercises, form and time of administering, dosage, the interval between doses, individual peculiarities, idiosyncrasies, habits, temperaments, incompatibilities, and variations for the different sexes and for children and adults, all must be taken into consideration by the teacher who would excel in his work.

Just why the same exercise affects differen persons differently, or why the same exercise agrees with a person at one time and not at another, or why a difference in manner, method, form, and environment should so affect the value of any exercise to the same person, are matters concerning which we have very little definite knowledge. For want of this exact knowledge we can recommend but few specifics for individual cases. But we do know that certain exercises done in a certain manner under certain conditions may produce special action on the nervous system, or on the secretions, or the blood, or that they may be made to act topically.

Without going deeply into the physiology of the subject, and attempting to state how certain results are produced, which is an unsafe procedure in the present state of the science, we may safely settle upon certain general principles that will guide us in making an intelligent selection of exercises for hygienic, educative, recreative, or disciplinary purposes.

As a general rule in all exercises the qualities at first required are the qualities at length developed. If they require quickness, quickness will be the result; if they tax the strength, increased strength will follow; if they require endurance, improvement in this direction will come with practice.

Thus exercises are divided into those tending to give general strength, like the handling of heavy weights, as in hammer-throwing and putting the shot; those tending to give local strength, as chest weights, iron dumb-bells, Indian clubs, and exercises on the heavy gymnastic apparatus; those tending to give quickness, as running, jumping, handball, and tennis. Exercises requiring a high degree of skill, as in balancing, advanced work with the Indian club, and the different feats of juggling with balls, wands, clubs, etc.; exercises of alertness, such as boxing, fencing, wrestling, baseball, etc. Exercises of endurance, as distance running, rowing, swimming, mountain-climbing, etc. Exercises requiring concentrated attention and varied responses to commands, as military tactics, Swedish gymnastics, and many calisthenic drills. Exercises which tend to make one supple and graceful, as the different varieties of dancing and æsthetic movements; or courageous and daring, as in football, swimming, and some of the forms of heavy gymnastics.

Then, again, some of these exercises may be done in such a way as to produce different effects from those I have named, and some may be even so executed as to enable one to realize nearly all of the results mentioned.

The examinations of men distinguished for great skill, strength, or endurance, and inquiries into the physical characteristics of different types of athletes has given us valuable information as to the tendencies of certain exercises to produce certain specific results. We can safely say that all exercise tends to improve the organism in some way, and to develop different traits, qualities, and characteristics through their effect upon the muscles, lungs, heart, brain, and general nervous system.

SELECTIVE TRAINING.

It is possible to make such a selection of exercises as will greatly improve the nutrition and consequently the physical condition of these important parts of the body and thus reinvigorate the whole organism. In order to accomplish this desirable object it is important for the physical instructor to acquire as much knowledge as possible about the normal condition of the being who is expected to react under the influence of this physical training. Therefore the question of diagnosis, not necessarily in the medical sense, but with a nice regard for the significance of those slight variations from the normal in the action of the heart, lungs, and nervous system, in the tone of the muscles, and the condition of the skin and special senses, is a matter of the greatest importance. Not that the instructor is expected to treat these premonitory symptoms of failing health, but that he may give his pupils the benefit of the doubt and advise them to consult a practising physician, who may then be able to exercise what in my opinion should be his highest prerogative, and actually prevent disease. . . .

The position of instructor or director in physical training in our American colleges to-day is a peculiar one. The young men holding these positions are for the most part college graduates and in many cases graduates from medical schools. They have imbibed from these institutions the principles of ethics, the theories of education and development, and a knowledge of the structure and function of the human organism. They have sought to apply these principles to the advancement of physical education. Curiously enough the opposition they have met with comes largely from the very class of men whose teachings and theories these physical instructors are trying to put into practice. . . .

This indifference on the part of many of our colleges as to the physical condition of the great mass of students might be borne with greater toleration were it not for the excessive zeal and exaggerated interest displayed over the performances of a few picked athletes.

If we did not know of the benefits of vigorous physical training, if we were ignorant of the increased power and energy that result from systematic practice of physical exercises, the students of our two largest universities might well afford to expend a hundred thousand dollars a year in calling the attention of the community to this valuable information. But when we consider that the general results of physical training have been known to the world for the past three thousand years, it does seem a little inconsistent and strangely at variance with the pretensions of learning, if not with the dictates of common sense, that the largest, strongest, and hardiest men in our collegiate institutions should be chosen to receive a vigorous body building in the practice of athletics, while the great mass of students who really need this training to fit them for their life's work find no worthy motive for physical action, and little interest manifested in their behalf.

A PLEA FOR RATIONAL METHODS IN PHYSICAL TRAINING.

Under our present *régime* those who most need physical training do not get it, while those who do not need it often get more of it than they want.

I know of no better wav of putting this subject on a rational basis than by checking excessive devotion to it on one side, and stimulating more attention to it on the other. The inevitable result of competition carried too far seems likely to work its own remedy in the first case if it does not actually kill the patient; but there is greater need of fostering care in the second.

Inasmuch as it is the scholarly men who will suffer the most for want of physical stamina, and as the scholarly men are frequently deterred from taking regular physical exercise from fear of lowering their college standing, I think it behooves the authorities to recognize in some way the well-meaning attempts and conscientious endeavors of this class of students to improve their physical condition, and encourage them to cultivate the body as an aid, and not to consider it as a hindrance, to the development of the brain. If ten per cent. of the students in our largest universities can carry their athletics and social propensities to excess, and still do intellectual work enough to entitle them to a degree, it is hardly just to infer that the remaining ninety per cent. would be less likely to attain as high a standard of scholarahip if they were induced to take physical exercise enough to keep them in good working condition.

I maintain that the only rational method that will enable us to accomplish this desirable object is by placing mental and physical exercises on the same plane, and by rewarding every honest and faithful attempt towards physical improvement by the same recognition that we bestow upon the efforts to improve the mind.

According to our present custom, few persons consult a physician unless they are ill or think themselves so, consequently but few physicians become thoroughly acquainted with those varying stages of physiological activity which distinguish a man in tolerable good health from one in a state of supreme vigor which in sporting terms is called "condition." In my opinion, this state of vital perfection, so-called, is rarely attained, and in the efforts to realize it many men are really put out of condition to meet the extraordinary demands which are often made upon their strength and endurance.

No one is quicker to recognize a falling off in ability or a tendency to grow "stale," as it is termed, than a skilful trainer who has his men under more or less constant observation. Like an experienced horseman, he may not know the physiological or pathological condition of the animal, but he does know almost by intuition when he is fit or not fit for the race-course.

In this respect, the physician, unless he has had a similar experience, may better leave these matters to the judgment and discretion of the physical trainer.

Where the medical student can best apply his time and energies is in increasing his knowledge of the being to be trained, and in trying to enlighten the general public as to the real significance of the term education. According to our best thinkers it is no longer a matter of mere literary training. To quote from Dr. Youmans: "Education is an affair of the laws of our being, involving a wide range of considerations, an affair of the air respired, its moisture, temperature, density, purity, and electrical state; an affair of food, digestion, and nutrition; of the quantity, quality, and speed of the blood sent to the brain; of clothing and exercise, fatigue and repose, health and disease; of variable volition and automatic nerve action; of fluctuating feeling, redundancy, and exhaustion of nerve power; an affair of light, color, sound, resistance; of sensuous impressibility, temperament, family history, constitutional predisposition, and unconscious influence; of material surroundings, and a host of energies which stamp themselves upon the plastic organisms, and reappear in character; in short, education involves that complete acquaintance with corporeal conditions which science alone can give."

In the bubbling, seething condition of education of the present day, I know of nothing upon which true progress is more dependent than upon a realizing sense of these important facts, and a just recognition of the unity of the human organism, and the absolute necessity of training mind-body and body-mind as the essential part of a perfect whole.

Descartes has well said: "If it is possible to perfect mankind, the means of doing so will be found in medical sciences." In attempting to bring about this "dual league" between mind and body as a matter of education, no class in the community have it within their power to do a nobler service for their fellowmen than the medical students and the medical practitioners.

PHYSICAL CULTURE FOR WOMEN.*

By F. B. Miner, M.D.,
WARREN, O.

In bringing this subject before this society I hope to arouse at least a passing interest in a matter that I thoroughly believe is by far too much neglected by our profession. A very large part of our practice is among women, and consists of diseases peculiar to that sex. Much has been thought, written, and said about prophylaxis of diseases of all kinds, but especially of these diseases of women. Dress reform, the abuse of the corset, suspending the clothes from the hips, and the use of high-heeled shoes have been discussed, and agitation along these lines has been eminently proper and not without results. There is no doubt that corsets are less worn, and those worn are not so tight as formerly in this country; that high-heeled shoes are almost unknown, and the shoulders are beginning to relieve the hips of their burden; and as a result the present generation of women is better qualified to take the woman's part in the struggle of life than those just passed and passing have been.

But is it not possible to accomplish greater results by beginning earlier in the lives of our women with our preventive measures? Why not endeavor to give them sounder, stronger bodies in which to start the sexual machinery going? Will not strong, muscular bodies, with tissues toughened by physical exercise, such as young men enjoy, go far toward preventing versions and flexions of the uterus, ovarian congestion, and kindred affections? Will it not give them stronger nervous systems and more resistance to all forms of disease?

Much of the so-called female weakness originates in the school-room. Should not our school-teachers be required to have a more definite knowledge of anatomy and physiology before being allowed to take charge of a school including girls at or approaching puberty? Our public-school teachers have a great responsibility along this line; a responsibility that they are not meeting in most cases, because they are ignorant of that branch of work.

It has been the custom among parents to impress upon the minds of their girls at a very early age that they are girls, and that they must no longer run and race and romp with their brothers, because it is unladylike. They must play indoors with dolls and quiet games, must learn to be proper and nice, while the boys of their household are out of doors playing football or baseball, running races, and in innumerable ways using just as much fresh air as they can pass through their young lungs. What is the result? While these boys and girls start even, while they are equally healthy and strong the first five years of their lives, at the age of puberty the girls have fallen way behind. The boys are stalwart youths, accustom themselves to all manner of athletic performances, have appetites that never fail, are always full of life and seldom tired. How different the picture of their sisters! They have grown to be frail girls who can neither walk, stand, nor sit for any length of time with comfort. Their only exercise is obtained from their piano practice. They have too little life to get out into the pure outdoor atmosphere, and if a breath of fresh air should by any accident reach them, an attack of bronchitis is the result. Their appetite is never good, and wholesome food is a stranger to their stomachs; headache is an almost constant companion; their menstrual periods are times of more or less suffering, and often incapacitate them entirely for work for several days. Is the contrast a little overdrawn? Have we not all seen just such families as these, and many of them?

It surely was not according to the original purpose of the Creator that woman should be physically so greatly man's inferior. From her entire subjection and supposed inferiority to man during the period of his barbarity, she has risen to be his peer intellectually, and very far his superior morally; nor will it be long before she will take a place a little below him physically. And it is not only our privilege as physicians, but our duty as well, to use our influence to hasten that day.

---

* Read before the Union Medical Association of Northeastern Ohio, at Akron, February 11, 1896.

Experience during the last few years has proven that systematic physical exercise will do as much for the female body as for the male. A few years ago when it was proposed to give woman an opportunity to obtain a higher education, and to open the colleges for her to study alongside her brother, the cry was that she was not intellectually strong enough to compete with him in the class-room; but it did not take her long to show him that he would have to do his best work to keep even with her in his class-work. Then the objection was advanced that physically she was not equal to the prolonged strain of a college course. This was more nearly true, and many women have gone through college at the expense of their health. Indeed, it has been at the expense of health that many girls have gotten through or even into the high school. But soon the experiment was begun of giving her the same opportunity for the proper development of her body as was given her fellow-students. In all the better colleges where women are educated, gymnasiums are established with well-trained physical directors, and a certain amount of systematic physical work is required, under the watchful eye of these directors. And under this system many women have not only been able to complete the college course who doubtless would never have stood it without, but at the same time have undergone a wonderful physical development. From the colleges the idea of physical culture has spread among other women, until there is quite a number of gymnasiums now established for women.

There is no doubt that there are many opportunities for severe injury to women from gymnasium work. So there are among men, and yet we believe in the work for men if it is properly conducted. There may be greater possibilities of injury among women than among men, but there is no good thing in this world that is not liable to abuse.

That the physical culture as conducted at Vassar is a great benefit cannot be denied. Unless furnishing a certificate from the house physician excusing her from gymnasium work, every student is required to take a certain amount of class-work. Before going into the gymnasium thorough physical examination is made. Measurements of all parts of the body are taken, both as to size and strength. If any pathologic condition is found, the student is referred to the house physician. From these measurements the physical director determines the exact development of the person, and prescribes special exercises to develop every poorly developed part; and thus is built up a systematic development; the lung space is increased, the heart is strengthened, and with greater general development always comes a more perfect nervous condition, and the person is put upon a higher plane of health and vigor. Better health in women means stronger and better progeny, subject to better home care than is received by children of weakly mothers. Thus the next generation will receive a better start in life, both as to health and morality.

These gymnasium opportunities need not be confined to college girls. Every town could easily have a good practical gymnasium, if we, as physicians, would arouse ourselves to study its benefits and teach the people. Such a gymnasium need not be excessively expensive. A single wall machine, costing ten dollars, will develop not only every muscle in the arms and legs, but those of the trunk as well. The back gets its full share of development, as do the abdominal and side muscles. And these need special exercise in women to counteract hereditary weakness, the result of generation after generation putting on splints to do the work properly assigned to these trunk muscles. If corsets were discarded and these exercises systematically used, a very great improvement would be seen in the strength and endurance of women. With a slight modification of this machine we can get special exercise for the intercostal muscles, and with their development deeper, stronger breathing and less tendency to shortness of breath and lung affections. In calisthenics we get general or systemic results, greater tone is given to the whole muscular system, while the regular apparatus work gives development of muscle for which it is necessary that the muscle shall overcome resistance. All these exercises stimulate the heart's action and thereby the heart-muscle is developed and circulation improved. We have here also a natural remedy for that bane of womankind, constipation. Massage, with aid in other lines, is one of the best cures for chronic constipation. We have in gymnasium work the possibility of a natural massage of the abdominal contents by the abdominal muscles, similar to, but much more vigorous than that which we get in walking. These instances might be carried out almost indefinitely. We see them practically demonstrated over and over again in every gymnasium for men.

A ladies' gymnasium should be under the direct supervision of a physician who has himself a good knowledge of gymnasium work. By him a thorough examination of heart and lungs should be made and such other examination as he may see fit to make in each individual case. The work should be in charge of a well-qualified physical director, who should carefully take all necessary measurements, and with a special knowledge of the application of all apparatus for special development, should prescribe and direct the exercise of each case. Carefully carried out, physical culture for women could not fail to be of very great utility. What is the vital difference between the male and female tissues that one will not take on development equally with the other? We feed them with the same nitrogen, carbon, hydrogen, oxygen, phosphorus, and lime. The chemist has never announced any difference in the combinations of these elements in the tissues of boys and girls. The anatomist has told us of no difference in the general formation of the body, its blood and nerve supply, nor has the histologist in the minute structure. The physiologist seems to take the human body with no distinction of sex in his treatment of the subject of waste and repair. Why, then, if their tissues are alike, will the influences that affect the one for good or ill not affect the other likewise? If young men are benefited by proper physical culture, why not young women as much? Thus is not the reasonable conclusion of the whole matter, that women are not strong because they are denied the opportunities of cultivating strength? And is it not our duty as the conservators of the health and strength of our fellowmen to study the subject of physical culture for women as we would study any therapeutic measure, from a practical standpoint?—*Cleveland Jour. of Med.*

WOMAN AND THE WHEEL.

By Dr. Sarah I. Shuey.

I have been prompted by the frequent adverse opinions on the use of the bicycle, accredited to physicians, to present my opinion, based on a year's experience and observation, particularly from a health standpoint, in regard to women.

Hundreds of women in every walk of life are suffering from the lack of proper exercise. Our physical culture departments show appalling deficiencies in chest development. At the University of California, the young women students, before training in the gymnasium, show narrow, hollow chests, small lung expansion, and weak arm and chest muscles. Most of the teachers in our schools might be placed in the same category. Another class, much larger, the girls in stores and shops, present similar deficiencies. How can it be otherwise, standing as they do the livelong day, or sitting at the sewing-machine in a close, stuffy room? The position required in running a sewing-machine is necessarily soon fatiguing to the muscles of the back, which must be kept rigid, the eyes at the same time intent on the seam, often for hours at a stretch.

The sewing-machine is frequently likened to the bicycle, but compare it with the free and joyous motions of the wheel, in the fresh air, with the blood tingling through the veins, and ask yourself if there is any similarity.

Take another class of women, the woman of leisure, aimless and pampered, with whom time passes wearily on a soft couch, or in illy-constructed chairs, in assemblies where the air is heated and impure, what would not wholesome exercise do for her in mind as well as body?

There is no exercise more favorable to good circulation of the blood, to symmetrical and all-round development of the muscles, than that of the wheel. The abuse is what is to be condemned. A thing being abused is no reason for condemning the thing itself. No one thinks of not eating because there are thousands of dyspeptics. Therefore, let women not give up the wheel, but find out the right way to use it.

Horseback riding, tennis, croquet, walking, or dancing will not equal it; housework will not equal it as an all-round exercise. The exhilaration of the motion, the tonic of the fresh air, the excitement induced by the element of danger, if the equilibrium be not maintained—all these accelerate the heart's action, send the blood bounding through the body into the finest capillaries, thus equalizing the circulation, relieving congestion, cooling the throbbing and aching head, and giving altogether a most enjoyable and healthful sensation. But to promote health by the use of the wheel, and to procure the greatest benefit possible, certain rules must be observed.

First, the heart and lungs must be unimpeded in their action; therefore the corset must be discarded and any style of dress that tends to constrict the waist. The body must be clad in tight flannel, preferably the "Jaros," that is fleece lined, and permits the free perspiration to pass easily through its meshes, thus preventing too rapid cooling off and resultant colds.

Let the outer garments be of a material to suit the taste of the wearer. Skirts should be avoided, as they act not only as sails, impeding the progress and requiring too great exertion, but they interfere with the freedom of the movements, and are dangerous in case of accidents. All accidents that have occurred to me have been directly or indirectly due to the skirt. Bloomers made too full also catch the wind. Knickerbockers are preferable. Thoughtful wheelmen, in a position to judge, earnestly advocate an appropriate dress for woman in riding the wheel. It is as necessary for her comfort and safety and development as the gymnasium suit for physical culture.

Second, the adjustment of the seat. It must be so placed with relation to the pedals as to permit full extension of the leg, not keeping it cramped, as in the short, pumping motion of the sewing-machine. This pumping motion soon tires the knees and the muscles of the legs between the knees and the hips.

Third, the seat itself must be placed at an angle or in a position most comfortable to the rider, so that neither the end of the spine nor the pubic bone is pressed upon. Unfortunately, the bicycle seat, as well as the pneumatic tire, is capable of great improvement in construction, and the person who will make a bicycle seat physiologically adapted to the rider's need, and a tire that will neither puncture nor blow out, will receive the thanks of grateful thousands.

Fourth, the height of the handle-bars. This is a very important consideration. By all means have them at a height that will not require the curving of the spine, which is at once not only ungraceful, but dangerous to health, for it narrows the chest, brings undue pressure on the heart, and forces the contents of the abdomen upon the yielding pelvic organs. In riding uphill it is not necessary to bend forward; one can ride with more ease and exert greater power of the legs in an upright position.

Fifth, do not dispense with the brake. It adds very little to the weight. One may seldom use it, but it is invaluable in an emergency, and may save a serious accident.

Sixth, stop the wheel before dismounting. Many a sprained ankle or knee has occurred from jumping while the wheel is still in motion. Do not undertake coasting. Do not take long, exhausting rides. Do not join a club, and overstrain yourself by riding as far as the strongest.

In learning to ride, spend but a few minutes the first time attempting it. The chest and abdominal muscles of most women are soft and flabby, or altogether lacking. They must be gradually developed. The beginner is apt to hold her breath, or breathe imperfectly, though she still keeps exercising her feet ; the result is a palpitating heart, and a throat and mouth so dry from excitement or fear that she can scarcely speak. Do not ride more than ten or fifteen minutes at a time without dismounting, until the muscles have gained tone and strength. An hour's ride is enough for one who has full mastery of the wheel. Avoid streets just watered. Avoid turning corners at a high speed. Cross a car-track at right angles to the track.

Do not ride either up or down a steep hill. The former puts the heart to too great a strain ; the latter incurs too great a risk to life and limb. Do not ride at a rapid pace, nor indulge in racing, for one's own safety and that of pedestrians.

After riding, if in a perspiration, or very warm, avoid cooling off rapidly. The best way is to take a vigorous scrub bath, with warm water, rinsing with the water gradually cooled down until it is quite cold. Dry the skin quickly by rubbing with a Turkish towel, and put on dry clothes. All this will not take more than ten or fifteen minutes, and the rider will not only be invigorated, but spared stiff and sore muscles. The early morning hours are the best time for practice. Rise an hour earlier than usual, take a luncheon of brown bread and butter, or a glass of milk, practice for half an hour ; then enough time will remain for a scrub bath before breakfast.

In no case have I seen bad effects, but exceedingly good results in the use of the wheel, when it is used with judgment and moderation. I have seen sleeplessness overcome, dyspepsia banished, weak backs strengthened, chests broadened, depressed spirits dispelled and replaced by a buoyancy and cheerfulness that the poor nervous patient never hoped to possess.

To be of real value and genuine benefaction to womankind, the exercise must be systematic and regular. Spasmodic exercise is a useless waste of time. It is often as injurious as eating ; that is, at one time a feast and another a famine, or an alternate gorging or starving.

Beside the advantages to the physical system derived from a proper use of the wheel, there is a gain in moral strength, self-control, confidence. It is the imperative duty of every woman to give her body intelligent care. Health depends upon it. There is no home whose comfort and happiness may not be diminished or destroyed by ill-health and frequent illness. Besides, every woman owes it to herself and to posterity to do those things that will make her well and keep her so. No mother has a right to curse her offspring with a weakened body, which means, more or less, a weakened mind.

Let me then urge women again to ride the wheel with moderation, controlling all temptations to overdo, no matter how fascinating the exercise, and the result will be a healthier body and a more cheerful and rational frame of mind. — *Pacific Health Jour.*

HEALTH AND MENTALITY.

By N. N. Riddell, Ph.D.

"A sound mind in a sound body" is an old maxim, but is as true to-day as when first uttered by the sages of antiquity. In our mad rush for wealth, learning, or fame, amid the diversity of opinions among physicians, physiologists, hygienists, mind healers, and Christian scientists, there is perhaps no subject of such vital importance, that receives so little careful, unbiassed, intelligent investigation and consideration as that of the relation of health to mentality. Very few find time or have the opportunity for thorough investigation of this subject, so that the great majority, even among intelligent people, are quite unable to appreciate the influence exerted by the various states of health over mental manifestation.

It may seem like an exaggeration to those who have never studied this question carefully, yet those who have will concur with us in saying that quite as many are deficient in energy, emotion, animation, ambition, decision. power of concentration, perception, memory. morals or individuality of character from indigestion, a torpid liver, poor circulation or shattered nerves, as from lack of brain development or native ability.

Men are everywhere wishing they had more of brain power, wanting to increase their mental caliber, regretting that their brains are not better developed in this way or that, as though brain development was all that was necessary to produce energy, business sagacity, will-power, mental genius, or moral stability. Business men are compelled to constantly resort to the memorandum, and daily lose opportunities to have made a turn because they did not think till the opportune moment was past; students pore over their studies for hours to master the lessons that should be learned in one-fourth the time; professional men complain of having so much on their minds that they are unable to give due attention to anything; thousands constantly labor under a cloud of discouragements, while others are so constantly wanting in energy as to be constitutionally tired; all of these mental defects and peculiarities are usually attributed to their brain developments, whereas the truth is that quite as many suffer from these mental defects from the lack of good digestion, rich blood, strong circulation, pure air, and sound nerves, as from the want of brain development.

A large brain, of excellent proportions and of splendid organic quality, that draws its sustenance from a weak body in which one or more of the vital functions are but partially performed, will be able to accomplish far less than a much smaller brain that is thoroughly supplied with rich pure blood that has been completely oxygenized. The power of cerebration or brain action, which is the measure of mentality, is determined quite as much by the health of the nerves, the quality and quantity of the blood that passes through the brain, as by the amount of gray matter. While it is true that without gray matter there will be no mental manifestation, and that the amount of the one is the measure of the other, it is equally true that unless there is an abundant supply of well-oxygenized blood the gray matter will soon lose its power to generate thought. Strong, vigorous circulation, arising from good digestion, healthy nerves, and deep breathing, is the basis of physical energy. That dull, heavy, listless feeling, that constitutional weariness that impedes the progress of so many students, business and professional men, is more often caused by a torpid liver and a poor circulation than by a lack of development at the base of the brain. The weak, effeminate, undecided, vacillating way not unfrequently met with is more often the result of dissipated nerves than a deficiency of that part of the brain that gives rise to courage, firmness, and dignity.

Many a student struggles throughout his entire college years, barely able to pass his examinations, and envying his more brainy classmates their superior powers of perception and memory, never suspecting that it is his non-hygienic living that causes his mind to be thus dull and his memory so unretentive.

Impure blood, freighted with an excess of carbon, causes his brain to burn and steam, but it does not think. A proper diet, composed mainly of cereals and fruits, with an abundance of pure water and pure air, would increase the mental capacity of a very large per cent. of college students from a quarter to a half, and cause them to congratulate themselves on their keenness of perception and accuracy of memory.

Ministers, especially those who aspire to pulpit oratory, suffer perhaps more than any other class from not giving the matter of vigorous health due consideration. With many the entire week is spent in the preparation of their sermons; everything must be written out in detail, and then committed to memory. By Sunday they have a well-prepared discourse, without any vitality or mental vigor to give snap, animation, or pathos to its delivery. Their well-rounded, carefully constructed sentences fall as gently on the half-sleeping congregation as autumn leaves after a frost, while their thrilling appeals, that on their first conception seemed pathetic enough to melt a heart of stone, have so lost their ardor as to fail even to warm the conscience or quicken the sensibilities of their auditors. The good man sinks into "blue Monday" and tries to decipher why his Sunday's efforts were not better appreciated, and wonders at the hardness of men's hearts, that they are not more moved by such eloquent presentation of the gospel. These disappointments, that are no less real to the congregation than the pastor, are not so often the result of a lack of power as of not knowing how to use it. One-half the time spent in study, in mental and spiritual preparation, the other half in physical preparation, would produce far more effectual sermons and satisfactory results.

A thorough training of the chest muscles, so as to completely inflate the lungs, good digestion, pure blood, and a strong, vigorous circulation, would add very largely to the average pastor's power to move the people.

Business men fail quite as often from eating too rapidly and thereby producing dyspepsia, from smoking too many cigars and shattering the nerves, or from dissipating their forces and destroying their capacity to do business, as from lack of native ability or the fluctuations in trade. Very few persons will ever know what their mental capacity really is, for very few live sufficiently in keeping with the laws of health to allow the brain to do its best. It is impossible to make anything like a correct estimate of our capacity to work, do business, think, study, enjoy, be good, or do good, until we have learned the laws of health and know how to apply them, to meet the requirements of our physical and mental peculiarities.—*Health Culture.*

SIR EDWIN ARNOLD ON THE PROFESSION.

THE address delivered by Sir Edwin Arnold to the students of the Medical School at St. Thomas's Hospital on the occasion of the distribution of prizes is one full of praise of the medical profession and should be read by all its members. The delightful and sympathetic way in which Sir Edward traced the wonderful discoveries and advances that had been made during the Victorian era was well calculated to fire the young men commencing their career with noble ambitions. Sir Edwin Arnold is no cold admirer of the medical profession, which he characterizes as "the best, the gentlest, the loftiest, and the purest of the secular crafts which men follow," and as "an army whose victories are the triumphs of all mankind, and whose enemies are all men's enemies."—*Ind. Med. Gaz.*

ACIDITY OF THE URINE AND GASTRIC CONTENTS IN THE HEALTHY AND THE DYSPEPTIC.

MATHIEU AND TRÉHEUX (*Arch. gén. de Méd.*, November, 1895) describe their researches on this subject. They examined the urines hourly during the afternoon after the midday meal. They carried out their investigations on 12 persons after 84 meals, thus making over 400 estimations of the degree of acidity of the gastric contents and urine. The individuals examined were the subjects of hyperchlorhydria with and without symptoms, of gastric dilatation, carcinoma, etc. The authors conclude that: (1) There is a relation between the acidity of the gastric contents and the urine. (2) The greater the production of acid, whether by secretion or fermentation, the greater the amount of acid excretion in the urine. (3) Normally the acidity of the urine falls during the first three to five hours after food, when it increases. (4) Most often there is an almost absolute parallelism between the two curves of gastric and urinary acidity, but this is destroyed after a repast by the presence of polyuria. (5) If the acid is withdrawn by any means from the stomach the amount in the urine also falls, and the latter may even become alkaline. (6) The average quantity eliminated by the urine hourly is greater in hyperchlorhydria than in hypochlorhydria. (7) Milk increases the acid in the urine owing to its giving rise to lactic acid in the stomach. (8) It is not possible, at any rate at present, to trace the curves of urinary acidity so as to bear indirectly on the question of the chemical variety of the dyspepsia. (9) Milk must be excluded from test meals when these curves are to be studied; and (10) patients should be subjected to a constant regimen for some time before the investigations.—*Brit. Med. Jour.*

M. HAFFKINE.

WITH reference to the farewell meeting given by the Calcutta Society to M. Haffkine, the *Times* has a eulogistic article on his work in India, and concludes by saying that controversy may continue with regard to the precise value of inoculation as a prophylactic against cholera. But there can be no controversy as to the disinterestedness of purpose and the nobility of aim with which Dr. Haffkine has labored to protect our soldiers in India and the Indian people from that terrible disease.—*Ind. Med. Gaz.*

TUBERCLE BACILLI IN MILK.

OBERMULLER (*Hygien. Rundschau*, 1895, No. 19) undertook to examine milk purchased from dealers, for the presence of tubercle bacilli, because it seemed probable that, in view of the large number of tuberculous cows, bacilli would often be present in milk. He therefore injected into the peritoneal cavity of forty guinea-pigs 2 to 2½ c.c. of milk. Of these forty, three died from extensive tuberculosis of the peritoneum. In a second series of experiments the author used the sediment of centrifugalized milk mixed with the cream of the same milk, because it was learned from control experiments that bacilli in centrifugalized milk not only reach the sediment, but also the layer of cream. With this mixture he injected intraperitoneally twenty-six guinea-pigs, giving each 1 to 1.5 c.c., and of these ten, or 38 per cent., died from tuberculosis. Inasmuch as boiling as well as pasteurization of milk in reality are only palliative measures, he advocates strongly the weeding out of tuberculous animals after testing with tuberculin.—*Jour. Am. Med. Assn.*

PUBLIC LIBRARIES AND THE DISSEMINATION OF DISEASE.

LIBRARIES have repeatedly been accused of spreading disease. A recent communication from a London librarian to the Westminster *Gazette* shows that precautions are adopted in the public libraries both by London and the provinces. The library receives each day a list of the houses in the parish where infectious disease exists. No books, under any circumstances, are issued to readers in the infected houses.

If books have been loaned to dwellers in one of these houses previous to the outbreak of the disease, notice is immediately sent that the books are not to be returned to the library, but retained and delivered to the sanitary authorities, who undertake to collect the volumes without delay and thoroughly disinfect them.

A fine not exceeding £5 is imposed upon borrowers who return to the library books that have been exposed to infection.—*Am. Med.-Surg. Bul.*

CYCLING VERSUS MORPHINE.

IN Chicago—that city of hurrying men and restless women—there were, so a popular preacher said not long ago, no fewer than 35,000 persons who habitually took hypodermic injections of morphine to save themselves from the pains and terrors of neuralgia, insomnia, nervousness, etc. Cycling has become the rage in Chicago as elsewhere, and the morphine-takers have discovered that a long spin in the fresh air on a cycle induces sweet sleep better than their favorite drug. The result is said to be that the number of those in Chicago who take hypodermic injections of morphine is diminishing. Exercise and fresh air are known to all doctors to be the cure for half the ills flesh—and especially nervous overwrought city-bred flesh—is heir to.—*Brit. Med. Jour.*

BOOK REVIEWS.

Diet in Sickness and in Health. By Mrs. Ernest Hart, formerly student of the Faculty of Medicine of Paris, and of the London School of Medicine for Women; author of "The Micrometric Measurements of the Blood-Corpuscles and the Estimation of Their Hæmoglobin," "The Third or Invisible Norris Corpuscle," "On the Formation of Fibrine," and translator of "Conil and Ranvier's Pathological Histology," etc. With an introduction by Sir Henry Thompson, F.R.C.S., M.B. London. 218 pages, 8vo, with full index. Price, $1.50. Published by W. B. Saunders, 925 Walnut Street, Philadelpia.

Alice M. Hart is the wife of Ernest Hart, editor of *The British Medical Journal.* This should be a sufficient guarantee of her ability to present a book that would be safe for the lay reader; but she has done more than this, she has presented by reason of her skilful education, practical experience, and naturally talented mind one of the best books on the subject of dietetics which it has been our pleasure to notice. We cannot do better than refer to the contents of the book to convey a practical idea of its value. Chapters 1 and 2 cover food and food values; 3 to 6 inclusive cover the subjects of stimulants and restoratives, 8 to 18 has reference to feeding, over-eating, thinning and fattening, digestion and indigestion, and invalid foods; 19 and 20, acute gastritis and ulcer of the stomach; 21 to 25 inclusive, diabetes; 26 to 28 inclusive, gout and uric acid diathesis; 29, consumption; 30 to 32 inclusive, rickets, scrofula, and fever; 33, typhoid fever; 34 and 35, chronic Bright's disease. There are also seventeen admirable illustrations. Mrs. Hart's book should be added as a valuable accession to the working armamentarium of every physician and nurse in this country.

Health in the Home. A Practical Work on the Promotion and Preservation of Health, with Illustrated Prescriptions of Swedish Gymnastic Exercises for Home and Club Practice. By E. Marguerite Lindley, Lecturer on Health Culture. Published by the author from her home, Murray Hill Hotel, New York. 414 pages, 8vo.

The title-page of this admirable book conveys an excellent idea of its scope. The illustrations are more than ordinarily good, and exhibit such practical suggestive exercises that any one may easily adopt them. The book sets forth in simple language very useful lessons on health and covers a wide range of subjects in this direction. It should be in every home, for through its teachings women may secure better health and avoid the ills which cause disease. Mothers will be enabled through its teachings to lay good foundations for the future healthful lives of their children. This is a book which physicians may well recommend to their patients as a study in *preventive medicine.*

Catalogue of Messrs. Park Davis & Co.

We have just received the catalogue and price-list of Messrs. Park Davis & Co. for 1896, which is something more than a mere commercial list of medicines with prices affixed. It is a book of pharmaceutical information of great value. There are 208 pages taken up with the list of medicinal preparations. There are five pages devoted to digestive ferments and food products. There are 28 pages of "Notes of Reference." There are 10 pages of "Synonyms," and a full index. We are thus specific in reference to this book, for we wish to convey to medical practitioners as near as possible a good idea of the exhaustive and painstaking work which has been performed in the making of this catalogue.

The business of Park Davis & Co. has increased to such an extent that they have opened new branches in Baltimore and New Orleans. The scientific skill of preparation and the purity of their medicines are well known, and it is this status which impels the Gazette to this notice of that splendid pharmaceutical manufacturing company. Copies of the "Price-List" will be sent to any physician on request.

THE
DIETETIC AND HYGIENIC GAZETTE
A·MONTHLY·JOURNAL OF·PHYSIOLOGICAL·MEDICINE

VOL. XII. NEW YORK, JUNE, 1896. No. 6

COOKING AND DIETETICS.

AN ADDRESS BEFORE THE NURSES IN THE TRAINING SCHOOL OF THE WEST PENN HOSPITAL.

By DR. E. B. BORLAND.

GENTLEWOMEN: It is one of my pleasant duties to meet this evening an audience composed almost entirely of women; an audience made up of earnest students of the subject of the address about to be delivered. We salute you by the term *gentlewomen* because we believe the term *woman* is the proper term to use when we wish to express a synonym of neatness, carefulness, sympathy, nobility, and devotion to duty. We do not use the term *lady*, because that word may refer to any useless appendage to society, that is, to an individual who is not in any way helpful to the human race.

What to eat and drink, and what not to eat and drink, under the varying conditions of health and disease, and how to properly prepare food for the sick, are the questions which will be discussed this evening.

Food is intended by nature to replace tissue waste. It can do this only when properly cooked, and when it is properly digested and assimilated. If it is not properly prepared for the normal stomach, it is liable to ferment, to sour, and to poison the individual who eats it. Nature has provided certain guards so that it is almost impossible for poisons to get into the human system through the normal stomach. The action of the digestive juices protects the system to a great extent against poisons that might otherwise enter into it through the alimentary canal. We speak of this action as being antiseptic. All the processes of digestion are in a measure antiseptic in their nature.

In the administration of food to the sick we should always bear in mind the great influence of the nervous system over the digestive organs. We should give food only when the patient is not fatigued, nor under the influence of any exciting or depressing emotion.

The idiosyncrasies of the patient must be studied by the nurse who would succeed in her profession.

In selecting the proper food for a sick person, we should study the condition of the patient and the disease from which he is suffering, in order that the food administered may be an aid to nature and not a hindrance. We must study not only the character of the food to be given but the proper quantity as well. We must seek to give Nature as little extra work as possible in the digesting of the food.

Nature is trying to fight back disease, and when she is engaged in this conflict she is not able to digest what would be under normal circumstances a suitable and proper amount of food.

What we have said in regard to the influence of the nervous system leads us naturally to insist upon a period of complete rest on the part of the patient before food is offered to him.

Very few patients require the frequent administration of food even in most debilitating forms of diseases. As a rule, it may be stated that three or four meals in the twenty-four hours, carefully selected as to kind and properly graded as to quantity, are amply sufficient.

It should be our aim to permit no food to enter the stomach until that which has previously been taken shall have been thoroughly digested and assimilated and a sufficient interval of time have elapsed to allow the stomach to recuperate from its labors. It is not proper either in the sick or in the well to introduce fresh food into a stomach containing partly digested food.

Food Pleasing to the Eye.—It is essential that all food carried into the sick-room should be pleasing to the eye and small in quantity. Every nurse of experience in the caring for the sick will bear me out in the assertion that food should be of appetizing appearance and only sufficient in quantity to tempt the appetite of the patient. Of course, we must bear in mind the fact that the character of the food must always be governed by the nature of the disease.

Depraved Appetites. — We should at all times consult the wishes of the patient in regard to what food is desired, but we should never allow a depraved appetite to select improper food or an undue quantity of a proper food. We are well aware that over-eating is the dietetic sin of civilized as well as uncivilized nations, and that there is just as much intemperance in eating as there is in drinking.

The Digestion of Food.—Food is digested by three principal organs: The salivary glands, the glands of the stomach, and the glands in and attached to the small intestine.

The first digestive process takes place in the mouth, and can only take place when the food is thoroughly and completely masticated. The digestive action upon the food in the mouth is caused by an element contained in the saliva, which is called by physiologists *ptyalin.* This substance acts only upon a certain element contained in the food. It changes the starch into what chemists call *dextrin.* This dextrin is the half-step between starch and grape-sugar. When starch is fully digested it is changed into grape-sugar. It will thus be seen that the ptyalin in the saliva plays a most important rôle in the processes of digestion.

The next organ of digestion is the stomach. This organ is lined with two principal kinds of glands. One of these glands secretes hydrochloric acid and the other forms the digestive pepsin. These are the essential juices concerned in the digestive processes in the stomach. They are secreted as called for. They digest such articles of food as the lean of meat, which is the best example I can give you of the action of these juices. They also digest mainly certain vegetables, such as beans, peas, etc. The stomach not only performs a chemical duty in the processes of digestion, but it actually does mechanical work as well. It goes through what might be roughly called a "churning motion." It is on the move all the time it contains food. The object of this continuous motion is to cause the food to be thoroughly mixed with the digestive juices. When this stomach digestion is completed we call the product *chyle.* This product is then passed through the pyloric end of the stomach into the small intestine. Here it meets a secretion from the liver called *bile*, and as it progresses further on its journey in the small intestine it also comes in contact with pancreatic juice. Still further on it is acted upon by juices secreted by the lining mucous membrane of the intestine.

We have noticed that the saliva changes the starch into dextrin and that stomach juices digest nitrogenous articles of food. In the intestine these digestive processes are still further elaborated and the final product taken up by the veins and lacteal vessels and carried into the venous side of the circulation. It is then carried to the lungs to undergo oxidation.

Cooking.— Cooking accomplishes three factors in preparing food for digestion. First: It kills germ life. Second: It aids digestion by softening and separating the particles of food. Third: It creates new flavors, which tempt the appetite.

We have alluded to classes of foods. The simplest classification is the division into nitrogenous and non-nitrogenous foods. As examples of the first I may mention lean meats, the casein of milk, most of the contents of egg, etc. These articles go to make up the solid structure of the bones, muscles, etc. The non-nitrogenous articles of food are the fats, starches, and sugars. Potatoes, rice, arrow-root, fat meat, both cane and grape sugars, are examples of non-nitrogenous articles of food.

We now come to the proper preparation of food, and what will be said may be applied to the preparation of food for the well as well as for the sick.

Starches must be thoroughly cooked, and this cannot be done by any open wet process. Boiling in an open vessel will never cook starch. It may separate the particles of the starch but it does not change it in any degree. Starches should be at least partly changed into dextrin by heat. This can only be done by raising the temperature to between 300° to 400° F. In boiling, the temperature does not rise above 212°, and this temperature is unequal to the task of converting the starch into dextrin. This can only be accomplished by cooking in a closed vessel or in an oven. We can bake starch, roast starch, or fry starch, but we cannot boil it in an open vessel.

Meats.—A general rule for cooking meats, no difference how you cook them, is that the cooking must begin with a temperature of at least 212°, or the temperature of boiling water, if you wish to produce a tender product, appetizing and digestible. This temperature must be maintained for about five minutes, after which it should be lowered to about 180° or 200° Fahrenheit, and left to simmer until the meat is tender. It makes no difference how long it takes to produce this result. That is the proper way to cook meats, and the rule should govern the boiling, broiling, or roasting processes. In roasting, broiling, or frying, we must bear in mind that if the heat is too great we will develop a most unpleasant flavor. If you raise the temperature above 370° the fat will be decomposed, and this is not at all desirable.

Preparation of Fruits.—Fruits should be boiled for a few minutes only, unless they are very dense and solid. It is not necessary to cook fruits until they are dissolved and mixed with the water in which they are cooked. Cook them briskly for a few minutes only.

Meats should be seasoned before cooking, vegetables afterwards. Every cook is acquainted with this rule.

We will now pass to the consideration of the four different methods of preparing meats for the table. We have little to say about the most common way of preparing meats by the frying process. Fried meats are least digestible, least palatable, and least tender. It may be the least trouble to cook meats in this manner, but it is also the most wasteful. Even the savages rarely fry meat.

Boiling meat is far preferable to frying it, either for the sick or the well. The rule must here be followed of plunging the meat into boiling water, allowing it to continue for about five minutes, and then move the vessel to the back of the stove where the contents will simmer at the temperature of about 185°. The plunging of the meat into the boiling water seals up the surface, coagulates the albumin on the outer surface, and thus preserves intact the middle portion of the meat. If you continue to boil the meat at 212°, as every cook knows, you will render it tough and indigestible and destroy its flavors.

Roasting.—The most scientific cooks of to-day will place their roasts on the top of the stove where the temperature is 300°, and coagulate the albumin on the surface of the meat, before placing the roast in the oven, where a temperature should be maintained of about 200° until the meat is tender.

The broil is probably the best manner of preparing meat for the sick.

Foods may be classified under three heads: First, Highly digestible. Second, Moderately digestible. Third, Questionable foods. I have reference in this classification to food prepared for the sick, but these questionable foods are foods which are borne by very few well people. However, we are speaking more specifically with regard to sick people. Food which is highly digestible for the well is not always the best for the sick. There are times when it is better to give the sick some of the moderately digestible foods in preference to those which are highly digestible. In many diseases the patient's stomach is all right. For instance, it is not always desirable to give a patient suffering from lung trouble the simplest and most easily digested food all of the time. Generally speaking, the acute diseases and a great many chronic troubles call for highly digestible food. I will mention a few of the highly digestible foods. First on the list I will place home-made bread. Bread that is raised by the yeast germ, and not ammoniated alum or any of the compounds peculiar to modern machine bakers. Milk is highly digestible, and should be sterilized or boiled before using. It should not be taken as a drink. When its use is indicated it should be given very slowly in sups from a tablespoon. Meats such as beef and lamb are highly digestible. Soups that are made with cold and warm water not exceeding 170° F. are digestible, but those which are made by continued boiling are not to be classed among the highly digestible foods for the sick. Among the starches we have rice, barley, and potatoes. These starch preparations should not be boiled, but should be cooked by baking or roasting. An egg is highly digestible if properly cooked, but a half raw egg is not very digestible for either the sick or the well. The egg should be cooked so that it will be light. This can be accomplished by the open method rather than by boiling. The egg should be placed upon a hot skillet at a temperature of about 300°. When cooked sufficiently to turn easily this should be accomplished without "slapping" it. In this manner you can cook an egg in about one and a half minutes. It will be cooked evenly and nicely and not be hard. It will be what we call a "light egg." A heavy egg is one which remains on the skillet for several minutes. Young chicken boiled, broiled, or roasted, is easily digestible. Some fruits freshly stewed, or freshly preserved in glass jars, but never in tin cans, may be considered as highly digestible; especially is this true of black raspberries, blackberries, and grapes.

We now come to the second class of foods, the moderately digestible. Among these may be mentioned veal, turkey, goose, oysters, fish, corn-cakes, very light buckwheat-cakes, oatmeal, tomatoes, onions (as they are ordinarily prepared), foreign fruits, cheese, cooked fruits, cherries, peaches, pears, apricots, elderberries, nuts, pie-crust (that which is made with little shortening), and sponge-cakes. Among the ordinary articles of food these may be classed as moderately digestible, and may, under some circumstances, be given to the sick.

Under the third class we have questionable foods for the sick and questionable foods for the well. We do not say that these are forbidden to everybody, but they are questionable foods for the majority of mankind, and humanity would be the gainer if they were never eaten. Among these foods may be mentioned pork, ham, the gelatine preparations, pickles, cabbage, especially boiled, and sauer-kraut. Raw cabbage is the most digestible. Flannel-cakes, mince-pies, soups made with raw flour, and decomposed cheese, are questionable foods. By decomposed cheese we mean such varieties as limburger and quite a number of others prepared in the same manner, which are allowed to decompose before being sold. Strong cheese is more digestible than the weak article. By strong cheese we mean that which contains a great deal of rennet of the calf's stomach. This element aids in digestion in the human stomach. Cheese that is allowed to decompose is really not fit for either the sick or well.

There is a very simple test which the nurse can easily make, and which will determine, in a great measure, what foods are proper to be given to the sick. This test is made with cold water. A piece of almost any article of food the size of a thimble which will rapidly soak up cold water is moderately digestible. Pie-crust, as made by most cooks, will not soak up cold water readily, and is not to be considered as even moderately digestible. Puddings that fulfil this test may be considered as moderately digestible. Of course this rule shuts out all gelatine preparations. It shuts out fat-soaked starches, and raw starches in general.

Meat Soups and Meat Teas Compared.—We have so long administered what we call nourishment in the shape of beef-tea that many have come to imagine that there is an extraordinary amount of nutriment in it. And this opinion has been held by many physicians who have lived during the past century. Now, however, it has been demonstrated that there is no nutriment in beef tea as it is ordinarily prepared. It is not, however, to be entirely discredited, but it should be administered as a slight stimulant if the conditions indicate it. It contains only some of the flavors of the meat. The main nutritive part of the meat is lost in the boiling, which coagulates the albumin in a lump. If the beaf-tea contains no albumin, it contains, comparatively speaking, no nutrition. When we come to prepare food for the sick from meats we may prepare it in the form of soups by using lean meat chopped up finely. Soak it in cold water for an hour or so and then bring it to a temperature of from 150 to 160° for another hour, but never exceeding 170°. A higher degree than that will coagulate the albumin. Then it should be strained through cheese-cloth and the liquor reserved and placed on the stove to boil a few minutes only. The soup is now ready for the patient. It contains minute particles of albumin which may be seen by the microscope and is very digestible. Beef-tea made in this manner contains a large amount of nutrition, but as it is ordinarily prepared it contains practically none.

Bread is an ideal food, belonging largely to the starch family.

The Preparation of Fish.—As a rule, the flavor of fish is best preserved by baking or roasting.

Condiments.—Salt and good pepper are condiments which, when used in moderation, aid the digestion; but no other condiments or spices are either necessary or desirable. Highly spiced articles of food or a large amount of condiment of any sort should not be used by either sick or well.

Drinks.—Among the drinks appropriate to the sick-room may be mentioned coffee, wine, tea, and cocoa.

Good coffee is probably the most refreshing beverage that is taken into the sick-room, if it is properly prepared. Coffee not properly prepared is worse than no beverage at all. There are two ways in which coffee may be properly prepared. In the first place you want good coffee, green coffee, or coffee which has not been roasted several months or even years before it is used. The green coffee that is freshly roasted in an air-tight pan, in the home where it is to be used, and freshly ground just before it is used, makes the fragrant beverage worthy the name of coffee. A tablespoonful of this coffee on an average for a large cup will be quite sufficient. This drink can be prepared quickly and is very acceptable to the palate and refreshing in effect. There are two ways in which coffee may be properly prepared. One essential to either method is to have a nearly air-tight coffee-pot in order to keep the fragrance and aroma of the coffee inside the vessel and prevent its escape with the steam. Good coffee may be prepared by putting the requisite quantity in a coffee-pot containing cold water and allowing it to come to the boiling point, or it may be prepared with boiling water, placing the pot on the back of the stove for a few minutes where the temperature ranges from about 170 to 175°. Tea is prepared as an infusion, and its preparation does not need any special consideration. Cocoa is a nourishing, heating beverage which is not very essential in the sick-room, as a rule, because it is hard to digest. Wines have their use in the sick-room and are generally prescribed to patients who are recovering from acute diseases. As a rule, they should be given at meal-times and only as directed by the physician.

An ideal meal for an average individual, either sick or well: Home-made bread and butter, broiled steak, stewed grapes or apples, baked potatoes, coffee, and water *ad libitum.*

Now we will endeavor to present for your consideration some foods which are especially forbidden in certain diseases. I may state that one very common and troublesome disorder of the skin is due, in the majority of cases, to improper diet. I refer to hives. This disease is often produced by eating fish, pork, cheese, pickles, sauerkraut, or strawberries, particularly if a little stale. These foods, therefore, should be avoided by individuals who are subject to hives. They may produce the disease in the sick and yet be usually harmless when the individual is well.

Constipation is another very common disorder. In these cases water should be given to the patient frequently, notwithstanding the fact that he may be receiving medical treatment. One of the great faults of the civilized nations of the present day is that they drink too little water, and this is specially true of women. At least three pints of *water* in the twenty-four hours are necessary to carry out the physiological processes properly.

Dyspepsia is a common disorder of the present age. It may be divided into two classes, the true and false. In true dyspepsia the stomach is damaged. This form of dyspepsia requires the highly digestible foods prepared with the greatest care. The false dyspepsia may be termed simply a lack of the nervous system which does not call for any special line of diet.

In diarrhœa we should always use cooked food for the reason that the disorder often arises from the germ life which may have entered the system by the eating of raw food. We should give patients suffering from diarrhœa little water at a time, but an amount sufficient to allay the thirst.

Patients suffering from typhoid fever call for foods which are digested in the stomach. Starches are contraindicated because they are largely digested in the intestines, where the characteristic typhoid lesions are located. Many fever patients have starved to death on the old-fashioned so-called beef-tea, made in a bottle. Finely chopped fresh lean beefsteak, broiled, is *the* proper nourishment for the typhoid patient, unless he prefers the nutritious meat-soup heretofore described. Raw milk is contraindicated on account of the danger of tubercular infection through the ulcerated intestines.

Tuberculosis, commonly called consumption, requires, generally speaking, a meat diet, and a liberal supply of fats, if the patient can bear them. It has been positively demonstrated that meats are more easily digested where the stomach is weak than are vegetables, and this is especially true in persons suffering from tubercular disease. The rule to follow in the diet of tubercular persons is to give them as much meat as they will take. Let it be your aim to create an appetite for meats except pork. You can do this, in the majority of cases, if great care is exercised in the preparation of the meat.

Give patients suffering from rheumatism plenty of water and very easily digested food, selecting the different foods from the first class mentioned — those which are highly digestible.

Diabetes is a disease in which the liver and probably the kidneys are concerned, and it calls for a diet from which starches and sugars are eliminated, because the system is engaged in manufacturing sugar out of anything and everything that is capable of producing it.

RECAPITULATION.

As I have already spoken at some length, and as I feel sure that some of you are becoming tired, I will now proceed to a brief recapitulation. In a talk of this kind I regard a recapitulation of the essential points as very necessary, because it serves to fix them in your mind. First: The cooking of starch. Remember that it takes a temperature between 300° and 400° to convert starch into dextrin. Boiling does not accomplish the cooking of starch. Second: Never buy cooked or prepared food. This invades the province of the cook. You are never able to judge of the freshness of prepared foods. I consider it one of the greatest mistakes of the present age to allow food to be brought to the table which may have been prepared a thousand miles away, and perhaps anywhere from three months to fifteen years before it is placed on the table, and when it reaches it may be a mass of germ life, and would be as dangerous to eat as many of the drugs which we call poisons. Food can be best prepared in the kitchen by the cook immediately before its consumption.

I would like to emphasize and repeat what I have said in general about the cooking of meats. They should be exposed to the highest temperature at the very start. If you are preparing a roast, sear it over on the skillet before placing it in the oven, thus making a coating to keep in the juices. Then a low temperature of 180° to 200° F. until tender.

The test for the digestibility of the common articles of food: Articles which are digestible become soaked with water within a minute after immersion, and any article, except meats, which will not readily soak up the water may be considered as not easily digestible. Among these articles may be mentioned the gelatine preparations, pickles, fried foods, dumplings (as they are ordinarily prepared), short pie-crusts, and noodles. If these, or other similar articles, cannot become soaked with water in a short time, how can we expect them to become soaked with the digestive juices in the stomach of a sick person? It is important that we give the sick food that can be promptly permeated by the digestive fluids.

In conclusion, I wish to say that cooking is an accomplishment. It is noble because it is useful. Good cooking causes more happiness and poor cooking more unhappiness than perhaps any subject which we could discuss here this evening.

A young woman should never wear her dress below her shoe-tops until she can make an honest loaf of bread, broil a steak, and make a good cup of coffee. Many mothers are grossly negligent in these important matters in the education of their daughters. If training in these particulars were more rigid before marriage there would be less domestic infelicity after marriage. Bad cooking, I believe, does more to fill the divorce courts and the drunkards' graves than any other single factor which could be mentioned this evening. A young man who has no trade, no profession, no occupation in life is absolutely worthless to the community in which he resides. A young woman who does not know the rudiments of cooking is just as worthless. A young woman, as a rule, will not receive the attentions of a young man, with a view to matrimony, who has not the ability to provide a home for her, and a young man should be just as particular in regard to *the essential*, cooking, when selecting his wife. He should ascertain if she is capable of taking proper management of every department of the home which he is willing to provide for her. Every young woman should know how to cook before she leaves the parental roof. The women of the world who have achieved success are women who had been taught to cook while yet in their teens, and to cook well. Among those women we might mention Queen Victoria, the Empress of Germany, the Queen of Greece, and many of the wives of the Presidents of the United States, who were thorough cooks before they were out of their teens.

The woman in her home, under ordinary circumstances, who places food before her guests which was entirely prepared or cooked outside of her kitchen shows those guests a positive discourtesy. They leave her table with either the impression that she is grossly ignorant of *the* essential of every woman's education, cooking, or that she is too indolent to put her knowledge into practice.

A woman, according to the speaker's idea, and I believe his opinion is a fair representation of his sex, does not finish her education until she knows how to cook. A woman should not take upon herself the duties of a wife until she is at least able to personally oversee the preparation of the food of her family. I might go still further and say that the civilization and progress of a nation depend primarily on two factors: on the purity of its religion and upon the proper preparation of its food. Verily the hand that prepares the nation's food is the hand that moves the world.

SOME THOUGHTS ON THE ORIGIN AND SPREAD OF CONTAGIOUS DISEASES.*

By W. H. Faulds, M.D.

Aside from aseptic and antiseptic surgery, there is, perhaps, no subject in which, at present, the laity and medical profession are taking greater interest than the origin and spread of contagious and infectious diseases.

With the advent of antiseptic surgery came the germ theory of disease and the theory of contagion and infection through micro-organisms, and in this way was developed a force which has revolutionized surgery, and set at naught almost every principle upon which the leaders in sanitary and medical science had for centuries based their teachings and investigations.

That such a radical change in the fundamental principles of these great factors in the world of science should work a corresponding change in the means used for the prevention and spread of contagious diseases, goes without saying, and that the laity, physicians, and sanitarians should be tardy in adapting themselves to the new order of things is what might be expected. However, we believe the time has come when we, as physicians, ought to be preparing ourselves to measure up to the standard required by the new *régime*, and thus escape the censure which is sure to come from a confiding public, if we prove recreant to our trust. But in order that we may be successful, we must first have a clear conception of the principles which are to guide us in our efforts to accomplish the end in view.

A moment's consideration of the subject teaches us that almost all the vital processes are based upon the principle of supply and waste; the waste products serving as food for plant and vegetable life, and these in turn furnishing food for the higher and lower orders of animal life, and that waste material or filth becomes a source of disease only when misappropriated or diverted from its proper channel. In other words, the waste matter of animal life, if not properly appropriated, furnishes a hotbed for the reproduction of micro-organisms, which are now recognized as the chief factors in the production and spread of contagious diseases.

The land and city refuse swept into our rivers furnishes pabulum to the finny tribe, and they in return supply the most delicious meats to the inhabitants of every clime. But not only does the refuse contribute to the maintenance of all animal life, but the lower order of animals are sacrificed that those higher in the scale may subsist.

It is also true that this higher order may become the easy prey of the microscopical world, being sometimes swept down upon by an army of these minute invaders, their onslaught being more deadly than that of the best disciplined soldiery armed with the most approved weapons of modern warfare.

But besides being the avowed enemies of the human family, vulture-like, these infinitesimal wonders are ever on the alert, watching for the first symptoms of decay, always ready to assert their prerogative whenever a soil favorable to their development and propagation is spread out before them. Unlike the human family, that select the best in the line of animal and vegetable foods for their sustenance, these disease-producing organisms revel only in tissues of low vitality, caused either by temporary departure from health or the incipient stages of the process of degeneration and decay.

---

*A paper read before the Luzerne County Medical Society.

So intimately associated are they with the higher forms of life that they are found everywhere, even occasionally in healthy tissue. "They exist in the air, the soil, the water, in our clothing, on the surface of our bodies, and on the mucous membrane of the intestines and respiratory tracts." But, as we have already intimated, it is chiefly in decaying organic substances that they find a soil most favorable to their propagation and development. It is this special affinity of bacteria for animal tissue that has given origin to all the contagious and infectious diseases. Thus in scarlatina, diphtheria, measles, small-pox, typhoid, whooping-cough, and a host of other affections, we find in each its peculiar disease-germ, each having distinguishing features as familiar to the bacteriologist as the different types and races of the human family.

The question is sometimes asked, "Where did the first case of contagious disease originate?" One answer to this question is, that until spontaneous generation is proven and life shown to be the result of physical forces, these micro-organisms, capable of producing themselves, must rank with the higher orders of organic life, whose origin can only be traced to Him who in the beginning created all things. If the smallest germ of animal or vegetable life may be the product of physical forces, then all life, yours and mine included, may be the result of forces in nature, and we need no longer look to a Supreme Being to solve the mystery of the origin of life.

But assuming that the pathogenic germs had their origin with other forms of organic life, the question as to the origin of contagious diseases still remains unanswered, and the only explanation we have to offer is, that the first case of contagious disease was caused by the presence of virulent bacteria in human tissue of lowered vital resistance, and that the pathogenic bacteria were made such by cultivation in a favorable medium, furnished by the habits and environments of man at some period in the history of the human race.

That the virulent bacteria were not in their pristine state capable of producing small-pox, diphtheria, scarlatina, cholera, and syphilis seems reasonable from the fact that these diseases are spread only by contagion or infection from a previously existing case, and that these diseases can be clearly traced to the countries in which the primitive germs were first made pathogenic. Again, it would be hardly fair to assume that these countries were exceptions to the rest of the earth's surface in the matter of containing these germs, and that primitive man took up his abode in the only countries fruitful of disease-germs, and which have since given as a legacy to his posterity almost every pestilential disease to which human flesh is heir.

To me, then, a logical inference is that bacteria are present with the other forms of organic life in all parts of the habitable globe, and that all that is required to make them pathogenic is the favorable conditions which developed cholera and other germs in the countries where they first made their appearance.

The argument, then, is that the conditions favorable to arousing the microbe to a state of activity must exist before the disease can make its appearance. But the bacteria, once active, act in the presence of conditions that could not arouse the microbe from its dormant state. To illustrate: cholera, so far, has failed to gain a foothold in this country because the conditions here are not such as to arouse the dormant germ. However, the active bacillus from abroad, that has become virulent from repeated multiplication in a favorable soil, produces the disease here in its fatal form among the susceptible, just as it does in older countries. The same, I believe, is true of scarlatina, small-pox, measles, and diphtheria. Diphtheria was known and described by Galen. Memorable epidemics existed in Rome as early as A.D. 856, but it was not until eight hundred years later that this disease made its appearance in Switzerland and Germany, a century later in Naples, and about the same time in our own country.

So of scarlatina, although known as early as the first century of the Christian era, it was first described by an English physician in the sixteenth century, and extended to the Western world through European shippings in 1735, to Iceland in 1827, and to Greenland in 1847, showing conclusively that this germ, like diphtheria, was fostered and brought to a state of virulency still unknown to us by a people who, in a state of ignorance and religious lunacy, looked to their gods for relief, while they themselves were violating every principle of the laws of health. Again, small-pox was first mentioned by an Egyptian physician in the sixth century, and undoubtedly this germ owes its extreme vitality to the favorable conditions under which it was aroused into activity, and its virulence developed and increased.

So we might mention other diseases which exist here, but from which we would never have suffered had they not been brought to us from these disease-breeding countries, because the conditions here have so far not been such as to arouse the dormant germ.

This, then, is in brief our hypothesis concerning the origin of contagious and infectious diseases, the basis of which is found in Koch's theory, which must now be recognized as the starting-point of everything bearing upon this subject.

Prior to the discovery of Koch there were many theories extant regarding the spread of contagious and infectious diseases, none of which, however, received confirmation in more recent investigations. But now the generally accepted theories are those of this great leader in scientific thought. And as his investigations have shown that all contagious diseases are dependent upon the presence of a micro-organism, capable of self-propagation, the theory that every case of a contagious disease must have had its origin in a previous case at once became tenable.

This theory, however, was advanced by medical writers prior to the investigation by Koch of the germ theory of disease. Macnamara, in his discussions on cholera, says: "No amount of overcrowding, no special condition of the soil, nor any circumstances with which we are acquainted, has ever been known to originate Asiatic cholera *de novo* among men removed from its endemic influences, or unless the disease has been epidemic beyond the confines of India."

Again he says: "Every outbreak of the disease beyond the confines of British India may be traced back to Hindostan, through a continuous chain of human beings affected with their dejecta."

In 1881 Wilson, of Philadelphia, says of typhoid fever: "Without doubt the fever-producing principle is an organic germ, a *contagium vivum*, and is invariably derived from a previous case of enteric fever."

That cholera is spread by human intercourse is so well established as not to need elaboration, but you will pardon one or two brief quotations. Macnamara also states in his discussions that "the more explicit the examination, the clearer the fact appears that the disease (cholera), in the majority of cases, spreads from one human being to another by means of the cholera fomes finding its way into the drinking-water and thus into the intestines of other people."

"I by no means deny," says Pettenkoffer, "the transmissibility of cholera by means of man coming from an infected place. I consider man alone as the specific cause outside of the influence of the infected locality; moreover, I consider him the propagator of cholera, when he comes from a place where the germ of the disease already exists."

What is said of cholera, we believe, upon investigation, will prove true of scarlatina, diphtheria, small-pox, and tuberculosis. We have ample proof that these diseases had their origin in the Old World, and were in all probability spread only through human intercourse.

Diphtheria was first brought to this country through European shipping, and made its first appearance in Boston in 1735. "From thence it extended westward over the British colonies, reaching the Hudson and New York in two years, and after a time leaped over the barrier of the river. It gradually disappeared, attracting no further attention, except as a historical fact, noted by Douglas, Bard, Colden, and others."

Scarlet fever also had its origin in the Old World, and in its spread has been subject to the same laws regarding human intercourse as the other diseases mentioned. Again, tuberculosis, although known to the inhabitants of every clime, undoubtedly spread like cholera, syphilis, and diphtheria, from the thickly populated centres of the Old World, and is spread only, directly or indirectly, from animal to animal, or from man to man. That up to a few years ago there were isolated spots on the earth's surface that its virus had not penetrated, is rendered possible by the statement of Gibon, in the *Annual* for 1890. He says: "According to Certes, there are no pathogenic microbes to be found at Cape Horn. The Fuegians did not know anything about small-pox, measles, scarlet fever, or diphtheria before the inroads of civilized nations. Prior to the visits of the missionaries even pulmonary phthisis was unknown, and tuberculosis only began to establish itself in that country since 1881." It is said of the North American Indian that, prior to the discovery of America by Europeans, he was entirely exempt from the pestilential diseases. He had, in his primitive state, no ailments, so far as we can ascertain, except such as were incident to exposure and old age. The gold-hunters are said to have introduced small-pox into Mexico, and the adventurers from the Old World brought with them the eruptive fevers and loathsome contagious diseases of vice and immorality which are now found upon the islands and continent of North America.

A French writer is authority for the following statement: "A soldier returned home consumptive, after undergoing confinement in a Prussian military prison. Previous to his return no one in the village had for many years suffered from consumption. He expectorated freely, and it was observed that the fowls swallowed the expectorated matter. These fowls were given to a woman in the village, who was in perfect health, and in the course of four months she consumed sixteen of them. She had no direct communication with the patient, but after a time became consumptive. One of the fowls was killed and examined, and tubercle was found in the liver and other organs."

Again, it is said of cholera that the germs cannot retain their virulency long outside of human tissue. Thus, Pollock found that after each invasion or epidemic the germs died out, and with each recurrence there was a new importation of germs. This would account for the disappearance of the disease in this country after the epidemics which have several times visited us.

That this is true of diphtheria, scarlatina, and small-pox remains to be proven, but would appear probable from what has been said of the first epidemic of diphtheria in this country. That the germs must have lost their disease-producing qualities appears from the fact that the inhabitants were free from the disease from 1735 to 1835, a period of about one century.

This disappearance of the disease-germ, unless a fresh supply is received from human tissue, would seem to be in accordance with a law of the animal and microscopic world, that neither can exist long in the presence of the poisons of its own excretions. Thus we find in the overcrowding of human beings in jails, barracks, and camping-grounds, unless protected, they soon die of diseases produced by their own emanations. So the bacteria cannot long survive in the poisons which result from their presence in large numbers.

If, then, every case of a contagious and infectious disease has its origin in a previous case, and is spread directly or indirectly through human intercourse, and the germs of these diseases die unless reinforced from animal tissue, it is certainly fair to assume that if all the disease-producing organisms could be prevented from attacking animal tissue it would not be long before the virulent germs would have to return to their primitive dormant state for want of nutritive pabulum, and then would the declaration of Pasteur be verified, "That it is within the power of man to cause the parasitical diseases to disappear from the world."

If the principles here laid down are accepted as a working hypothesis, the destruction of the virulent bacteria by isolation, quarantine, and disinfection must form the basis of our efforts to prevent the spread of contagious and infectious diseases. It is true that these are the means usually employed, but it is well for us to remember that all medical writers are not in accord on this subject.

Pettenkoffer, who has given us an extended array of works on cholera, says: "Too much importance has been given to bacteria as an etiological factor in the spread of cholera, and that the importance of local conditions has been overlooked." He tried to prove his position by taking into his system the cholera bacillus; the cholera bacilli were found in his stools for eight or nine days after ingestion, but his health was not seriously affected. He is also strongly opposed to quarantine, and says that the spread of the cholera germ is not to be prevented, either in India or outside of it, by isolation, quarantine, disinfection, etc. He further says, "Just as in spite of custom houses goods are still smuggled over the frontiers, so the bacteria and viruses will be smuggled through all our barriers." He regards the millions expended in hunting down the germs as wasted effort, and that it should be diverted to the work of making people and places immune. But notwithstanding the opinion of this eminent author, the fact remains that, while no amount of overcrowding or filth will originate the disease *de novo*, the water and food supply once contaminated, and all classes allowed to mingle, so few places have been found to be immune, and so few persons so insusceptible to cholera germ as Pettenkoffer in this instance proved to be, as to make it very unsafe to follow his advice. I have cited this authority more to show how easy it is for eminent men to give adverse views concerning precautionary measures which sanitarians of equal eminence, after a long struggle, have barely succeeded in establishing.

The importance of isolation has long been recognized. A century ago Naples fined and even imprisoned her physicians for failing to report to the authorities cases of tuberculosis, the result being a reduction in the mortality from this disease of 90 per cent., and despite the fact that at a later period these measures were abandoned under the impression that this disease was not contagious, recent experience argues that isolation affords the only practical solution of the question of how to prevent the spread of this most fatal of all maladies.

It is said of England that, within the past few years, through improved hygienic conditions and isolation of tuberculous patients, the mortality has been reduced 50 per cent.

Philadelphia, during the past eight years, has reduced her mortality from phthisis 20 per cent. California, in view of the fact that it is rapidly becoming the great sanitarium for these unfortunates, is seriously considering the importance of the isolation of phthisical patients in order to prevent the spread of the disease.

I need not quote authority to convince you of the importance of this measure in the prevention and spread of diphtheria, scarlet fever, and the other contagious diseases which we are called upon to treat.

A question of more practical importance is, What are we doing to prevent the spread of disease? Our answer is nothing compared to what ought to be done. I would not for a moment disparage the work of our State board of health, or the efforts of our local boards. They are probably doing all in their power, considering the means at their disposal and the niggardly policy of our legislature by which they are handicapped. But I am convinced that nothing worthy of the effort will be accomplished until every person and animal threatened with or sick of a contagious disease can be isolated and thorough disinfection practised under the care and direction of a competent bacteriologist. In other words, we will never be successful in our efforts to stamp out the contagious and infectious diseases until a competent bacteriologist is employed to take charge of each case in its incipient stages, and empowered by the State to take such measures as shall completely protect the well from the dangers of contamination. If, as we have argued, a virulent disease-germ is abroad and cannot be destroyed so long as it can find a favorable soil for propagation in human or animal tissue, anything short of complete isolation will be wasted effort.

So far we have said nothing of what is being done by inoculation to render persons immune, or prevent the spread of disease.

If we were to judge of the value of this method of preventive treatment by the newspaper notoriety antitoxine has received, it would indeed be a great boon to humanity; but, as you know, the results thus far have been disappointing to the medical profession, and even if man could be rendered immune, the exceptions would be so numerous as to make it unsafe to depend on that alone.

Much of late has been said of increased vital resistance as a preventive against the invasion of virulent micro-organisms.

In those predisposed to tuberculosis, this is undoubtedly an important factor. But in cholera, small-pox, diphtheria, syphilis, and scarlet fever comparatively healthy persons are attacked, and if nothing in the physical condition or hygienic surroundings of the human family at the present day can produce the disease without the specific germ, as it has come down to us through propagation in human tissue, vital resistance would be of secondary importance compared to isolation, disinfection, quarantine, etc. In other words, if these measures are faithfully carried out, there would soon be no germs to attack even tissue of lowered vital resistance, unless the conditions of the Old World by which they were first aroused from their dormant state were recurrent. The results attained by vaccination in small-pox would seem to encourage a trial of this method of preventive treatment in other diseases, but we must not forget that while vaccination was a great discovery and has done much to prevent the spread of small-pox, we are also very largely indebted to isolation, quarantine, and disinfection for the immunity we enjoy from this disease. Indeed, I believe it is fair to assume that had it not been for the increased immunity made possible only by isolation and quarantine, mankind would have long ago lost confidence in the protective power of vaccination, and abandoned it as a useless procedure.

That there are almost insurmountable difficulties in the way of carrying out the measure proposed for the prevention of the spread of disease we frankly admit, but, nevertheless, the fact confronts us, that unless we can prove the correctness of our theories by the results obtained, the laity will soon lose confidence in our teachings, and refuse to co-operate in our work, and what has been regarded as the greatest discovery of the age—the transmission of disease through micro-organisms—may pass into oblivion, because of the stupidity of the laity and the want of faithful, persistent, courageous effort on the part of sanitarians and the medical profession.

A summary of our "thoughts" then is:

(1) That non-virulent microbes exist in all parts of the habitable globe.

(2) That they were made disease-producing in the case of cholera, small-pox, syphilis, diphtheria, and tuberculosis in the thickly populated centres of the Old World through overcrowding and bad hygienic conditions, such as have never been known to us.

(3) That the virus is always derived from a previous case, and is spread, either directly or indirectly, through human intercourse.

(4) That increased vital resistance renders persons immune only in exceptional instances, and in tuberculosis.

(5) That if virulent bacteria could be prevented from finding a lodgment in human tissue, they would, for want of nutritive pabulum, soon return to their primitive dormant state.

(6) That isolation, quarantine, and disinfection, under the direction of bacteriologists, are the only means by which we may hope to successfully prevent the spread of contagious and infectious diseases.—*Annals of Hyg.*

TRAINING THE BRAIN.

The home has been compared to the ship-yard, where the vessel's construction is slowly and painstakingly elaborated step by step, so that the structure may be able to outride the strains and disintegrating tendencies that are sure to attack it later, just as the growing human organism is built up, under fostering influences, by the gradual incorporation of helpful habits and useful physical reactions. Self-control and transparent honesty in the parent are as essential as obedience and self-reliance in the child.

"He that will have a cake of the wheat must tarry in the grinding." The child does not exist who can grow up natural or healthy without a fair share of the wholesome neglect and judicious exposure. Few realize the tremendous risk of over-caution and over-attention. A youngster is invariably happier with few and simple playthings than the multitude of complicated toys.

There is no such good fun or good training as making one's self useful, and it is cruelty to deprive the child of this pleasure and stimulus. Let the brain and body be trained through hand, foot, and eye. Dump a load of sand into the back yard, and let the children roll in it. Give the boys a carpenter's bench; encourage the girls to do housework. Where possible, let both boy and girl have a little garden-patch, if only a few feet square, and the care of a few plants. A woman in her home, a man in his garden: this seems to be a fundamental type from which we cannot entirely depart without risk to body and mind. The training of the muscular reflexes should go hand in hand with the cultivation of simple, natural, beneficent reactions in the higher planes. Cheerfulness, sincerity, industry, perseverance, and unselfishness may be acquired by practice and constant repetition, as much as the art of correct speaking or of playing the piano, and are far more necessary to health.

How often is a physician hampered in his efforts to help some sufferer because the latter has never acquired the art of obedience, or because he cannot tolerate a tongue-depresser, or swallow a pill or any unpalatable mixture, or take milk or some mainstay of diet; or because he cannot be left alone, or sleep in the daytime, or wear flannels, or sit still, or bear pain, or use his muscles, or take in certain classes of facts or ideas! These and similar peculiarities, which are a formidable hindrance to the physician, and may be a matter of life and death to the sufferer, can usually be prevented by a little care, or overcome by proper training. They are often the result of carelessness or over-indulgence, or that kind of cowardice which instinctively avoids the disagreeable, instead of facing a difficulty fairly and conquering it.

The children of the poor, in spite of many drawbacks, fare better in some respects than those of the well-to-do. They often respond better to treatment when they are sick; they are at least not deprived of contact with their fellows and that struggle for existence which are absolutely essential to health; whereas the children of the so-called higher classes are too often educated in sensitiveness and false views of life—not always by precept or example, but by force of circumstances. A colleague who is intimately acquainted with the physical condition of some eight thousand children, taken from the worst classes, who have in the course of several years passed through a public institution under his care, says that they improve so much after having enjoyed for a few months the ample diet and simple and regular life provided, that their physical condition compares favorably with that of any class of children.—*Popular Science Monthly.*

Department of Physiological Chemistry.

WITH SPECIAL REFERENCE TO DIETETICS AND NUTRITION IN GENERAL.

Edited by R. H. CHITTENDEN, PH.D.,

Professor of Physiological Chemistry in Yale University.

INTESTINAL FERMENTATION.*

As is now well known, fermentation and putrefaction are due to the presence of certain micro-organisms, chiefly bacteria and fungi, which in a suitable environment develop with great rapidity, forming, as the result of their life and growth, a long row of chemical products, both simple and complex, many of which at least are endowed with more or less pronounced physiological action. In a general way, the food best adapted for the rapid development of the majority of these micro-organisms is proteid matter, especially soluble and diffusible proteid, such, for example, as is formed by partially digested meat or other albuminous material, although soluble carbohydrate is equally adapted for the growth of many forms. Further, as with all living organisms, either simple or complex, water and certain inorganic salts are also essential. Again, the reaction of the medium is an important element in aiding or checking the growth and development of many of these micro-organisms. Most forms, however, appear to flourish most advantageously in an alkaline reacting mixture, although some forms grow well in a neutral medium, and some, indeed, manage to exist in an acid reacting mixture, especially if the acidity is due solely to weak organic acids. From these statements it is very evident that the gastro-intestinal tract, with its content of semi-digested proteid and carbohydrate foods, furnishes an excellent breeding-place for many forms of bacteria, the products of which must surely to some extent at least find their way into the blood-current and thus be distributed through the body.

If we consider the normal digestive proccesses of the intestine, we cannot but be impressed with the natural opportunities for variation existent there, especially at the commencement of the small intestine. The commingling of the acid chyme with its varying content of semi-digested food material, the alkaline pancreatic juice, the bile, and the secretions from the intestinal epithelium gives rise to a mixture of solids and fluids of ever varying proportions. The chemical reaction of the mass must likewise be subject to marked variability, since the acidity of the gastric juice as well as its volume are never constant, while both the alkalinity and volume of the pancreatic juice and the bile are equally subject to variation. Again, the normal or abnormal variations in absorption and peristalsis, as well as of secretion, lend their aid in giving variability to the composition of the material naturally contained in the intestine, and which constitutes the food material for the micro-organisms present there. Added to these sources of variation is a still more obvious one, viz., the variations incidental to the character and amount of the food ingested, which must in a variety of ways modify the quality and quantity of the material in the intestine.

These natural variations in the character of the culture medium must obviously have an important influence in determining the extent and character of bacterial growth in the intestine. The countless number of bacteria in the air we breathe, the food we eat, and the water we drink makes it very evident that a large number of these micro-organisms must find their way into the mouth and stomach. But of even greater importance is the fact that there is great diversity of form. Thus, Miller has isolated over one hundred species of micro-organisms from the mouth, while Macfadyen, Gillespie, and others have identified a large number of forms from the human stomach. When we consider, however, the rate at which most forms of bacteria develop under favorable conditions, it is quite clear that from some cause a large proportion of the ingested bacteria are rapidly killed off, or their further growth prevented, otherwise we should have the intestine swarming with these tiny organisms. Unquestionably, many of the bacteria which find their way into the stomach are eventually killed by the acidity of the gastric juice, especially when the latter contains much free hydrochloric acid. Indeed, if the contents of the stomach were always acid, in the proportion of 0.2 per cent. of *free* hydrochloric acid, the number of micro-organisms finding their way into the intestine would be greatly diminished. But when we take into consideration the fact that the human stomach frequently contains little or no *free* hydrochloric acid, that the proteid matter present may be even more than sufficient to combine with the acid secreted, that the combined acid has very little germicidal action, and that the gastric contents may be rapidly forced onward into the intestine, we see ample opportunity, especially after taking large volumes of fluid or after eating an abundance of food, for even those bacteria which are very susceptible to the action of mineral acids, to find their way into the intestine with their vitality unimpaired. Further, according to Gillespie,* many organisms can grow in the human stomach even when the contents are very acid, notably the bacillus lactis aërogenes, the bacillus coli communis, and pyogenic cocci. At the same time, as Mester* in Baumann's laboratory has recently shown, there is a close relationship between the acidity of the gastric juice and the extent of intestinal fermentation.

---

* Read before the Section on General Medicine of the New York Academy, May 19, 1896.

It is of course understood that under normal circumstances the micro-organisms of the gastro-intestinal tract come wholly from without, and that the various secretions themselves are practically free from germs. Further, as the recent observations of Thierfelder and Nuttall† show, the presence of bacteria in the intestinal canal is not necessary either for the life or well-being of the animal, at least not so long as the diet is limited to animal matter. Whether this conclusion will hold good for animals on a vegetable or mixed diet is still unsettled. Certainly guinea-pigs on a milk diet are abundantly able to digest their food and grow in size and strength with an utter absence of bacteria in the intestinal canal. In other words, the digestive enzymes naturally present in the several digestive fluids are quite capable of converting the food into assimilable forms without any aid from micro-organisms. Yet bacteria are constantly present in the intestine, as a rule more abundantly in the small intestine than in the large, and there is usually more variety to the forms found in the small intestine, especially in the upper part of the tube. In the small intestine the bacillus lactis aërogenes seems to predominate, while in the large intestine the bacillus coli communis is especially abundant. Many other forms are, however, present in the intestine, but the nature of the atmosphere there is such—the almost complete absence of free oxygen—that the conditions are favorable only for the development of the strict anaërobes or facultative anaërobes. Pyogenic cocci are very frequently present in the intestine, and a glance through the literature of the subject shows a long list of pathogenic bacteria, as well as of other forms, which have been found in the intestine under various conditions.

That many bacteria do pass through the

---

* The Bacteria of the Stomach, *Journal of Pathology and Bacteriology*, vol. i., p. 279.

* *Zeitschr. f. klin. Medicin*, Band 24, p. 441.

† Thierisches Leben ohne Bakterien im Darm: *Zeitschr. f. physiol. Chem.*, Band 21, p. 109.

alimentary canal unscathed is evidenced by their presence in the fæces. Bienstock[*] from his observations inclines to the view that in the case of healthy men bacilli only are to be found in the fæcal matter. Brieger,[†] however, has clearly identified the presence of a coccus in the fæces, and Kuisl,[‡] from observations on two healthy individuals extending over a month, found quite regularly in the fæces "comma forms" and spiral forms. Kuisl also observes that the greater number of the bacteria in the fæces are in a very weakened condition, although many are capable of cultivation in a suitable medium and at a proper temperature. In fact, many observations might be quoted from different sources showing that bacteria of many forms may be present in the intestinal tract, and frequently in great abundance.

Fermentative processes in the intestine are thus clearly accounted for, and we may now turn our attention to the nature of the process and the character of the products formed. In normal digestion we deal with enzyme action, a process in which the line of activity is dependent upon the chemical structure of the enzyme. The active agent is a chemical substance, and as such is resistant to the action of protoplasmic poisons. The activity of the formed ferments or ferment organisms, on the other hand, is bound up in the life of the cell; anything which interferes with the vitality of the cell interferes with the fermentative process, the latter being simply the outward manifestation of that life which is characteristic of the cell. Consequently, the products associated with any given fermentation process are simply the excretory or metabolic products from the cells' growth or development. If we scrutinize closely, however, the activity of these micro-organisms we find a double action in many cases, due to the manufacture on the part of the cell of a specific enzyme which, when once formed, starts out on an independent line of action and is obedient to the same laws or conditions that govern ordinary enzyme action. Probably in many cases, if not in a large number, the formation of a true enzyme is the first manifestation of chemical activity whenever the micro-organism begins to develop in its culture medium, the products resulting from the action of the so-formed enzyme being eventually broken down into simple products by the cellular activity of the micro-organism. The two processes can be clearly differentiated by the aid of so-called disinfectants. If, for example, moist blood-fibrin is allowed to stand in contact with the air for some hours it takes on numerous bacteria, and on now placing it in moderately warm water it gradually undergoes a change. In the course of a few days or weeks the solid fibrin is entirely liquefied and dissolved, odoriferous gases making their appearance at the same time as intermediate products in the process of decomposition. If oxygen is present in sufficient quantity, the process continues until the fibrin is completely converted into carbonic acid, water, ammonia, and sulphuric acid, these being the final products of the transformation. Contrast now this result with what happens when the fibrin which has been exposed to the action of bacteria is placed in chloroform-water instead of in pure water. After days or weeks, as the case may be, the fibrin gradually disappears as before, only the solution is not attended with the formation of gaseous products. The fibrin is simply converted into soluble proteoses and peptones with perhaps a trace of leucin and tyrosin, and this solely through the influence of the enzyme formed by the bacteria before coming in contact with the chloroform. The secondary action, however, is entirely wanting; the more profound changes due to the metabolic activity of the micro-organisms by which simpler products result are wholly lacking owing to the inhibitory action of the chloroform-water. The enzyme action in this case is closely akin to the action of the ordinary digestive enzymes, and the products formed are at least closely related if not identical. The secondary products, which are the typical fermentative or putrefactive products, owe their presence to the continued life and activity of the micro-organisms. This being interfered with fermentation does not occur, but the enzyme once formed continues its action wholly independent of the cell from which it originated. The enzyme will act equally well in the presence or absence of oxygen, but the micro-organism can produce its peculiar metabolic or secretory products only in that atmosphere which is best adapted for its growth and development. Fermi * has found proteolytic and diastatic enzymes in a large number of micro-organisms. Thus both kinds of enzymes were detected, and in some cases isolated from Koch's Vibrio, Micrococcus prodigiosus, Bacillus megaterium, Bacillus Millerei, Bacillus subtilis, etc. The trypsin-like enzyme has been discovered in a large number of different forms of both bacteria and fungi.

---

[*] Ueber die Bacterien der Faeces, *Zeitschr f. klin. Med.*, Band 8, p. 1.

[†] *Zeitschr. f. physiol. Chem.*, Band 8, p. 306

[‡] Beiträge zur Kenntniss der Bacterien im normalen Darmtractus, *Jahresber. f. Thierchemie*, 1885, p. 511.

The various forms of bacteria which find their way into the intestine produce from the contained proteid and other matter their own peculiar products. Of course, under ordinary circumstances, the enzyme action due to the bacteria is of small moment, since this action is slow in contrast with the proteolytic or amylolytic action of the ordinary digestive enzymes. As a rule, there must be plenty of soluble albumose and peptone present for the bacteria to thrive upon, still we must not lose sight of the fact that these micro-organisms have the power, through the enzymes they are able to manufacture, of rendering solid proteid matter soluble with formation of proteoses and peptones. So far as the ordinary bacterial decomposition of proteid matter in the intestine is concerned, peptone may be looked upon as the mother-substance out of which the various products are elaborated. The bodies first formed are the same as those formed by the proteolytic action of trypsin, viz., leucin, tyrosin, aspartic acid, tryptophan, etc.

The tyrosin, which is a typical representative of the aromatic group, is readily converted by the bacterial organisms into other benzol derivatives by cleavage, by oxidation, and by reduction, viz., into oxyphenylpropionic acid, oxyphenylacetic acid, paracresol, phenol, indol, skatol or methyl indol, skatol carbonic acid, etc., all derivatives of this aromatic group which is so characteristic of the albumin molecule. Less numerous are the bodies which result from the fatty groups of the albumin molecule, viz., leucin, ammonia, salts of the volatile fatty acids, caproic acid, valerianic acid, and butyric acid, also methane and hydrogen, while the sulphur of the proteid is partially split off as hydrogen sulphide and in part as methyl mercaptan.

The fatty acids formed in this manner by intestinal fermentation are probably in great part absorbed as soluble soaps, and eventually burned in the body. The aromatic products are likewise in great part absorbed and in part burned up in the tissues, but a certain proportion at least escape combustion and finally appear in the urine only a little, if at all, altered. They are, however, perhaps in the liver, brought into combination with sulphuric acid to form salts of ethereal sulphuric acid, and in this form excreted. Thus phenol, which in itself is more or less of a poison, is brought into combination with sulphuric acid, forming a salt of phenylic sulphuric acid which is comparatively inert, and in this form is thrown out through the urine. Similarly, indol and skatol undergo partial oxidation to indoxyl and skatoxyl, and are then combined with sulphuric acid to form a potassium salt of indoxylsulphuric acid (the indican of the urine) and a corresponding salt of skatoxylsulphuric acid. The aromatic oxyacids formed in intestinal fermentation are likewise found in the urine, in part at least, combined with sulphuric acid. It is on this account that the combined sulphuric acid of the urine is taken as a measure of the extent of intestinal fermentation or putrefaction, since these aromatic compounds must owe their origin to the peculiar activity of the micro-organisms present there.

These fermentative or putrefactive processes, so common to the intestinal tract, are by no means completely eliminated by the entire absence of food. Thus, in obser-

---

* *Archiv f. Hygiene*, Band 10, p. 1; also Band 14, p. 1.

vations made upon Cetti,* it was shown that while in hunger the excretion of indican was rapidly diminished, the output of phenol through the urine was greatly increased, and even on the eighth day of fasting was five times as great as the amount eliminated under normal circumstances. Further, in dogs the excretion of indican through the urine remains quite prominent during hunger, while the phenol may be greatly reduced in quantity. In other words, the albuminous matter of the several secretions, as well as the food-stuffs, constitutes material upon which the bacteria may thrive and from which they can manufacture their peculiar products. This is especially true of the pancreatic juice, with its marked tendency to undergo putrefaction, and Pisenti † has, indeed, found that ligation of the pancreatic duct causes at once a diminution in the output of indican through the urine, while the feeding of pancreas-peptone or the introduction of pancreatic juice into the intestine causes the excretion to increase at once. Especially noteworthy also is the effect of fasting in changing the relative output from the human body of indican and phenol, since it is so strongly suggestive of the influence of the nutritive medium upon the character of the metabolic products formed by the bacteria.

Under physiological conditions, intestinal fermentation is undoubtedly held in check by a variety of circumstances, among which may be mentioned rapid and complete digestion, vigorous peristalsis, and thorough absorption; anything which tends to interfere with the removal of the more fluid matter from the intestine ordinarily leads to an acceleration of the fermentative process. Further, the character of the food, as already stated, must have an important influence, especially the presence of carbohydrates. The latter, when present in large quantities, must exercise a decided retarding effect, owing to the natural tendency of the latter to undergo acid fermentation in the intestine, the free acids thus formed, such as lactic acid and acetic acid, having a very marked inhibitory effect upon the growth and development of most bacteria.

Further, diminution of proteid food must necessarily lead to somewhat of a decrease in the production of these aromatic fermentation products, and accordingly it is found that feeding with a diet mainly non-nitrogenous causes at once a decrease in the elimination of combined sulphuric acid through the urine.

How great a variety of bacterial products may be formed in the intestine under normal circumstances it is hard to say. Apparently few bodies beyond those already mentioned are met with, but it is quite likely that under suitable conditions small quantities of other substances may be formed. In any event, the toxicity of the products already known is sufficient to account for at least many of the minor symptoms characteristic of excessive intestinal fermentation. Certainly outside of the body, the putrefaction of albuminous material may lead to the formation of secondary products of more or less basic character, analogous to the vegetable alkaloids; poisons endowed with most marked physiological action and commonly spoken of as ptomaines. Many of these bodies belong to the class of diamines, notably putrescin or tetramethylenediamine, cadaverin or pentamethylenediamine, neurin or trimethyl-vinyl-ammonium hydroxide, cholin, gadinin, neuridin, muscarin, collidin, mydalein, mytilotoxin, etc. In addition to these, various toxalbumins are formed in some cases. None of these diamines or allied bodies are commonly found in the intestines, at least under normal circumstances, and perhaps are never formed there owing to the lack of oxygen. The intestinal bacteria, however, are quite able to form ptomaines, as Brieger has shown, for by cultivating the micro-organisms in gelatin the presence of ptomaines can be clearly demonstrated. Hence, we may well question whether under some circumstances true ptomaine-like bodies may not be formed in the intestine, to some extent at least. Primary bodies of equal, or even greater, toxicity may be formed in connection with cholera infantum, for example, as

---

* *Berlin. klin. Wochenschr.*, 1887, No. 24.

† Abstract in *Jahresber. f. Thierchemie*, Band 17, p. 277.

Baginsky and Stadthagen* have shown. Thus, these investigators were able to isolate from the stools of infants suffering with cholera infantum a bacterium showing great similarity to the Finkler Prior bacterium. On growing the isolated bacterium on sterilized horse-flesh for ten days they found no development of either phenol or indol, but were able to separate an albumose or peptone-like body possessed of extraordinary toxicity. The same toxic product was likewise formed by growing the bacterium in milk. Experiments such as these have given abundant evidence of the ease with which bacterial organisms are enabled to break down proteid matter, with formation of simpler compounds. The exact character of the cleavage or alteration products must vary more or less with changes in the attendant conditions, and no doubt there may be synthesis as well as dissociation by which still greater variety may be added to the products formed. That is to say, simple products formed by the growth of the bacteria may at times combine, perhaps under the influence of oxygen, or by other means, and more complex bodies with perhaps greater toxicity result. Certainly we have every reason for believing that excessive intestinal fermentation or putrefaction, either from excessive formation of moderately toxic bodies, or through the temporary appearance of bodies of greater toxicity, may cause various forms of toxæmia.

Again, it is to be remembered that the absorption of products from excessive intestinal fermentation may not only do harm through their direct toxic action, but also indirectly through their tendency to increase the susceptibility of the body to infection from other sources. Thus, it is a well-known fact that the chemical products of some bacteria tend to favor the development of infection with other bacteria. This peculiarity, moreover, is not limited to the products of pathogenic bacteria, but is equally characteristic of the saprophytic varieties, especially of the ordinary putrefactive bacillus proteus. Thus, Park and other writers lay much stress upon auto-intoxication from absorption of fermentative products in the stomach and intestine as a predisposing cause of infection, particularly with the pyogenic cocci. This predisposition, moreover, is said to follow even when the fermentative products absorbed from the intestine are insufficient to produce any direct toxic result; in other words, the intestinal products so absorbed presumably lessen the general resistance of the body to bacterial infection.

As to the exact character of the toxicity induced by the products of intestinal fermentation it is difficult to make any very general or concise statements. That the absorption of these products when formed in excess is attended with a general disturbance of the system there can hardly be any question. Many minor ailments are undoubtedly connected either with excessive intestinal fermentation or perhaps with modified intestinal fermentation, such as diarrhœa with offensive and perhaps fermented stools, and flatulence with abdominal pain and distention. Also anæmia, malnutrition, vomiting, headaches, the so-called "biliousness," and many nervous manifestations. At the same time there are recorded many observations showing an apparent connection between excessive intestinal fermentation as measured by the proportion of ethereal sulphates excreted through the urine and many more serious pathological conditions; indeed, in some of these cases the excessive intestinal putrefaction has seemingly constituted an important and almost constant feature, related more or less closely to the production of symptoms. Further, the marked formation of phenol in stricture of the intestine in cases of arrested peristalsis due to peritonitis, in diphtheria, scarlet fever, erysipelas, and also in those cases of extra-intestinal proteid putrefaction, as in putrid bronchitis, pleuritis, and gangrene of the lung, points to some intimate relationship between putrefactive processes and the pathological condition. What is especially needed is more specific knowledge regarding the exact nature and physiological action of the various poisonous products that are undoubtedly formed in the alimentary tract, but the problem is so complicated in many ways, especially by the small quantities that suffice to cause toxicity, that it will be long before we can hope to possess a clear understanding of the exact line of physiological activity characteristic of all the bodies and their compounds liable to be formed in intestinal fermentation.

---

* Ueber giftige Producte saprogener Darmbacterien, *Berliner klin. Wochenschr.*, 1890, p. 294.

How can we restrict intestinal fermentation? This is a question upon which the clinician may well have decided views based upon his own observations. There are many drugs which unquestionably exert an inhibitory influence upon fermentation or putrefaction. The preparations of mercury have long been used for this purpose and apparently with great success, as in the summer diarrhœa of children. At the present time the naphthols are widely used, viz., *a*-naphthol, *b*-naphthol, hydro-naphthol, and napththaline. These are said to be powerful antiseptics and are at the same time non-poisonous owing to their insolubility. Salol, which passes through the stomach unchanged, but breaks up in the intestine into carbolic acid and salicylic acid, would seem to be especially applicable to duodenal indigestion associated with excessive fermentation. Many other substances have been used under varying conditions with more or less success, such as carbolic acid, sulphocarbolates, creasote, aseptol, guaiacol, thymol, borax and boracic acid, iodoform, chlorine, and many others. As I understand the matter, however, there is much diversity of opinion regarding the antiseptic treatment of at least such diseases as cholera, dysentery, and perhaps typhoid fever. In the latter case, it is stated that the diarrhœa, offensiveness of stools, and meteorism are more or less controlled by antiseptics, and further that their administration tends to curtail the fever and lessen the duration of the disease, etc. Without wishing to even question the possible advantages of antiseptic treatment in many cases of excessive intestinal fermentation, I am, however, inclined to lay special stress upon the influence of diet in such disorders. Everything else being equal, it is obvious that the more digestible the food-stuffs ingested, the less tendency there will be for intestinal fermentation. On the other hand, the accumulation of difficultly digestible material in the intestinal tract affords one of the best possible conditions favorable for putrefaction. Hence, modification of the diet offers a ready means of controlling in part the output of toxic products from the intestinal tract. This probably explains, partially at least, the favorable action of a milk diet in intestinal disorders of this type. The ready digestibility of such a food, properly administered, as contrasted for example with cereal products rich in starch and with the contained proteid matter difficultly accessible, helps explain the beneficial results following a change from an ordinary mixed diet to a diet of milk. Aside from this explanation, however, there is apparently another point to be considered, viz., whether milk does not possess to a certain degree the power of resisting certain forms of putrefaction and of retarding somewhat the putrefaction of other forms of proteid matter? Observation certainly shows that a milk diet exercises a remarkable influence upon the number of bacteria present in the fæces of man and of animals. A healthy man submitted* for five days to a diet consisting in part of 2.5 litres of milk per day. The fæces of this individual on an ordinary diet contained 67,000 bacteria per milligram. On the second day after commencement of the milk diet, the bacteria in the fæces fell to 14,000 per milligram, and on the fifth day the bacteria amounted to only 2500 per milligram. By the use of sterilized milk the number was still more reduced. The milk diet exercises its peculiar action on the entire intestinal tract, putting the alimentary canal in a condition of partial asepsis. Thus, as Winternitz and others have shown, a milk diet tends to diminish greatly the excretion of combined sulphuric acid in the urine, and further, the fæces contain in such cases neither indol, skatol, nor phenol. Not but

---

*Gilbert and Dominici: *Comptes Rendu d. l. Société de Biologie*, April 14, 1894.

what the latter bodies may be formed to a certain extent, but in such small amount that they are completely absorbed.

This action of milk is not generally considered as due to any *direct* antiseptic influence, for as is well known many microorganisms grow to good advantage in this medium, notably the coli bacillus. More probably the action is associated with the changes the milk undergoes in digestion. First, it is readily attacked by the digestive enzymes, the products formed are readily absorbed and thus quickly removed from the intestine. Secondly, there remains an insoluble residue of nuclein which possibly exerts something of a germicidal action, tending to kill off the bacteria present in the canal. These two causes combined may help explain the beneficial action of a milk diet in those gastro-intestinal disorders in which the toxic products of intestinal fermentation are the ultimate causes of the particular symptoms manifested.

Still another factor possibly aiding in this beneficial result is the presence in the milk of the easily fermentable milk-sugar with its tendency to yield lactic acid. Feeding experiments made by Karl Schmidt* in Baumann's laboratory have shown, however, that this substance by itself, when added to the constituents of a regular diet, has little if any influence on intestinal putrefaction. This is explained on the ground that milk-sugar taken by itself is rapidly absorbed into the circulating blood; *i.e.*, it does not remain sufficiently long in the intestinal tract to exert any beneficial influence. But when ingested as a constituent of milk the precipitation of the casein makes a cheese-like mass in which the milk-sugar is held mechanically and its absorption partially checked. Further, the thickening of the contents of the intestine through the specific action of the casein may also aid in the retention of the sugar, thus allowing its conversion into lactic acid through the agency of the bacillus lactis, which acid may check the growth and development of many anaërobiotic bacteria. Hence, in milk we have a good illustration of how special forms of diet may inhibit greatly the development of bacterial poisons in the intestinal tract, and furthermore we see good reason for the belief that in many forms of intestinal fermentation or putrefaction a diet of sterilized milk, combined perhaps with the administration of a suitable antiseptic, constitutes an all-sufficient line of treatment.

ON THE NORMAL OCCURRENCE OF IODINE IN THE ANIMAL BODY.

By E. Baumann and E. Roos. Translated by William J. Gies, Ph.B.*

(*Second Paper.*)

I. PREPARATION OF THYROIODIN.

While engaged in the isolation of the essential substance of the thyroid gland we assured ourselves of the presence of the active agent in our preparations by noting their effect upon parenchymatous goitre, a sufficient number of cases of that disease having been at our disposal for this purpose. This reaction, first observed by Emminghaus and Reinhold, is so prompt that, as a rule, we were able within two to four days thereafter, to decide upon the degree of activity of the preparations tested. Most of these observations were made upon patients of the Polyclinic by inmates of that institution. We are under many obligations to the directors of that institute, Professor Dr. Thomas and Dr. Eschbacher, for the ready assistance given us in our experiments. The preparations tested were made in great part by the dye manufacturers, Friedr. Bayer & Co., of Elberfeld, according to our directions, to whom we desire to express our thanks, particularly as the quantity of thyroid glands obtainable from sheep here was not at all adequate for our purposes.

After the active constituent of the thyroid glands had been found to be an organic iodine compound, called "thyroiodin,"† a second method was discovered, by means of which the isolation of the body could be effected much more easily than formerly.

---

* *Zeitschr. f. physiol. Chem.*, Band 19, p. 378.

* From *Zeitschr. f. physiol. Chem.*, Band 21, p. 481.

† Baumann: *Zeitschr. f. physiol. Chem.*, Bd. 21, p. 319.

In all of our experiments we have proceeded upon the assumption that the active substance of the thyroid gland is not destroyed, either by heating at 100° or by the action of strong mineral acids. When the finely divided glands are treated with 10 per cent. hydrochloric acid and are allowed to remain in contact with this reagent for some time, the active substance does not appear to be decomposed. If the hydrochloric acid is poured off, neutralized with sodium hydroxide, and the solution evaporated, the dried residue, in quantities corresponding to a gram of the fresh gland, exerts a very marked action upon goitre.

After boiling the thyroid glands for a few hours with dilute sulphuric acid (one part in ten), almost complete solution of the tissue ensues, so that at the end of the period merely a finely flocculent precipitate remains suspended in the fluid, the amount of which gradually diminishes as the boiling continues. Practically all of the fat,* which of course is constantly to be found in the interior of the glands, at this stage of the process swims on the surface of the fluid and, after cooling, may be mechanically removed by straining through fine gauze. The quantity of sulphuric acid used ought to be equal to about four times the weight of the fresh glands. In this process it has been clearly proved that the active substance is not destroyed even after three days' boiling with the dilute acid. The thyroiodin is not completely dissolved in the boiling acid, but the largest part of it is found in the brownish precipitate held in suspension, which increases somewhat in quantity after cooling the acid fluid and may then be filtered off. The quantity of the precipitate obtained in this way amounts, at the end of the process, to from 0.75 to 1.5 per cent. of the weight of the glands employed.

The brownish colored acid fluid filtered from the insoluble portion contains a small part of the thyroiodin in solution. If the free acid in the fluid is almost completely neutralized with sodium hydroxide and the solution concentrated to about one-fifth or one-sixth its original volume, upon cooling, the greater part of the dissolved thyroiodin is thrown down. This separation is still more complete when the greater part of the sulphuric acid is neutralized with barium carbonate and the filtrate concentrated. The fluid filtered from the precipitate obtained in this manner always contains some thyroiodin, and when it is administered in large quantities it manifests a distinct though very weak action on goitre. The last traces of the iodine compound are extracted from the concentrated mother-liquor with boiling alcohol, which takes up the thyroiodin quite readily. In this process, however, substances other than the thyroiodin go into solution, from which complete separation of the latter is not easily made.

The main quantity of the active substance of the thyroid is contained in the undissolved portion remaining suspended in the fluid after the action of dilute sulphuric acid upon the glands. Before it is filtered off the fluid should be cooled for about an hour in ice-water. The brownish colored product thus prepared contains not only thyroiodin, but also fat, fatty acids, and other substances besides. For the further purification of the iodine compound, the precipitate while still moist is repeatedly extracted with boiling 90 per cent. alcohol, which gradually dissolves the thyroiodin, together with a small portion of the foreign bodies. The alcoholic extracts are concentrated on the water-bath, the residue is rubbed up with about ten times its weight of milk-sugar and, in order to get rid of the admixed fat and fatty acids, the triturate thus made is extracted with petroleum-ether, or with a mixture of anhydrous ether and petroleum-ether. The trituration with milk-sugar very materially facilitates the removal of the fatty substances. The thyroiodin may be separated from the milk-sugar first by dissolving the triturate in a little cold dilute sodium hydroxide and filtering the solution if necessary; then, upon acidification of the alkaline fluid the thyroiodin is thrown down in the form of a flocculent precipitate. The latter is filtered off, thoroughly washed, redissolved in sodium hydroxide, and reprecipitated with hydrochloric or sulphuric acid. As a result of this treatment part of the admixed coloring matter is removed with but slight loss of thyroiodin.

---

* Before being employed in this process the glands are carefully freed as much as possible from adherent connective tissue, fat, etc.

The thyroiodin purified in this way, when dry, exists in the form of a brownish colored powder, which is insoluble in water, and dissolves with difficulty in hot alcohol, easily in caustic alkalies. It contains a large proportion of nitrogen, a small quantity of phosphorus (about 0.5 per cent.), and approximately 10 per cent. of iodine. Upon heating, the odor of pyridine bases is evolved. The iodine is very strongly combined and can be broken off by the action of alkalies only with difficulty. Sodium amalgam gradually brings about the separation of the iodine. The chemical nature of thyroiodin will be more fully discussed farther on.

Doses of 1 milligram of thyroiodin prepared in this manner, which possessed an iodine content of about one-tenth of a milligram, showed, after three or four administrations of the milk-sugar triturate, very distinct and decided action on goitre. This experience proves, as was previously emphasized, that this action of thyroiodin is not dependent upon the small quantities of iodine which, in the form of the thyroiodin compound, are thus introduced into the system, but is brought about by the specific *organic iodine compound* which, under normal circumstances, is formed in the thyroid gland from traces of iodine compounds contained in the food.

In the method above described for the preparation of thyroiodin, losses, amounting to possibly as much as 25 or 30 per cent. of the total quantity of the iodine compound originally contained in the glands, are inevitable. Such loss of substance is very much less when the separation of thyroiodin from the thyroid glands is carried out with the aid of artificial gastric juice. By the use of the latter method, also, a less colored product is obtained than that separated by boiling the glands with acids. The artificial gastric juice best adapted for this digestion is that containing 0.3 per cent. hydrochloric acid. This is allowed to act for two days at 40° upon the thyroid glands, at the end of which time almost all of their substance passes into solution while practically all of the thyroiodin remains in suspension undissolved. The latter may then be purified as described above. The solution of hemialbumoses and peptones resulting from the digestion of the glandular tissue is almost free from iodine. If it be concentrated and its action upon goitre tested, it is found to exert only a very weak action even when administered in relatively large quantity.

After thyroiodin had been found to be the active constituent of the thyroid gland, the question next arose as to the form and character of combination in which it is contained in the gland itself. It is quite obvious that only a small part of the thyroiodin occurs as such—that is in the free state—in the normal glandular tissue, for while the aqueous and glycerin extracts prepared in different ways from the thyroid have always been found to be active, it has nevertheless been observed that their action upon goitre is invariably far less marked than that of a corresponding quantity of fresh gland. The following experiments give some insight as to the nature of these relations.

25 grams of fresh thyroid glands from sheep were well minced and extracted with boiling alcohol three times. The residue obtained upon evaporation of the alcoholic extracts was found to contain iodine, and later the iodine compound was proved to be identical with thyroiodin. The iodine found was not more than about the one-fifteenth part of the total quantity of that originally present in the glands. As a rule, the larger the content of iodine in the glands the greater also is the quantity of the thyroiodin which exists in the free state and may be withdrawn with alcohol.

Additional experiments have shown that the greater part of the iodine-containing compound of the thyroid gland may be withdrawn from it by extraction with cold water. However, a considerable quantity of thyroiodin remains in the residue which is insoluble in water. The latter exerts a weaker action upon goitre than the corresponding amount of fresh gland, although its activity is still very distinct, even in small doses.

More complete, though by no means thorough, withdrawal of the iodine compound from the thyroid gland is effected by extraction in the cold with a solution of glycerin containing equal parts of water and glycerin. The glandular residue remaining undissolved after three or four extractions, in this case also, contains a considerable quantity of iodine. When the glycerin extract is treated with an excess of absolute alcohol, a precipitate is formed which is found to include the greater part of the thyroiodin extracted.

Continued research has shown that the thyroiodin in the thyroid gland is in great part combined with proteid matter. The proteids of the thyroid gland were first studied by Bubnow,[*] who extracted them with water, salt solution, and weak potassium hydroxide. In this way he obtained three different bodies, which he designated as thyreoproteids. One of them manifests the characteristics of a globulin.

Notkin[†] has described a compound proteid which, by a method not carefully detailed, he isolated from the thyroid gland and called thyreoproteid. According to his view this thyreoproteid is a product of the general metabolism and gives rise eventually to the poison which, accumulating in the body after the extirpation of the thyroid, causes the appearance of the cachexia so characteristic after removal of the gland. Notkin believes further, that under normal circumstances this thyreoproteid is decomposed—at least its toxicity is destroyed—as a result of the action upon it of an enzyme, thyreoidin, contained in the secretion of the thyroid gland. This enzyme, in Notkin's opinion, is the specifically active constituent of the thyroid gland. Concerning it he says:[*] "Thyreoidin is composed of at least two proteids, of which one possesses the characteristics of the globulins, while the other, physiologically more important, has the nature of an enzyme."

The results of our own experiments in this direction have brought us to an entirely different conclusion. We have positively convinced ourselves that the essential principle of the thyroid gland bears no relation whatever either to an enzyme or a body of similar constitution, and that there is only *one* specifically active substance characteristic of the gland, the thyroiodin[†] we have described, which exists in the thyroid partly in the free state, mostly in combination with proteid matter, and may be broken off from the latter by the action of gastric juice and strong acids.

Numerous observations have established the fact that thyroiodin is the substance to whose specific action all of the phenomena peculiar to thyroid-gland therapy may be directly referred. In this connection should be mentioned: 1. The action upon goitre; 2. The influence upon metabolism both in man[‡] and in animals;[§] 3. The peculiar toxic effect in large doses; 4. Last, not least, the specific action of thyroid glands in myxœdema. Since the latter is a disease of rare occurrence here, we ourselves were not able to test the effect of our iodine compound upon it. We owe many thanks, consequently, to Prof. Leichtenstern, of Cologne, for very kindly undertaking to note the effect of thyroiodin upon myxœdema. He has made known to us the fact that the activity of thyroiodin is very marked. Later, we shall report upon certain observations made upon man and animals.

When finely minced thyroid glands are extracted from three to four times with 0.75 per cent. salt solution, all of the contained iodine compounds are dissolved. The residue remaining after this treatment is either entirely free from, or contains at most only traces of, iodine, and, even when administered in large quantities, it never manifests more than a very weak action upon goitre. After dilution with about fifteen volumes of water the salt-water extract becomes strongly turbid and, upon the introduction of carbonic acid, a finely flocculent precipitate is thrown down, which soon forms into fibrin-like shreds. The substance thus separated appears to be identical with the thyreoglobulin first described by Bubnow and subsequently isolated by Notkin. We have found that this globulin contains iodine, and that a small amount of the total quantity of thyroiodin in the gland is combined with it. Upon boiling it with dilute sulphuric acid, thyroiodin is split off and may be separated in the usual way. Toward parenchymatous goitre this globulin-like body is approximately as active as thyroiodin itself or as the fresh gland. It may be obtained in greater abundance from the salt-water extract by saturation of that fluid with crystals of magnesium sulphate.

---

[*] *Zeitschr. f. physiol. Chem.*, Bd. 8, p. 1.

[†] *Wiener med. Wochenschr.*, 1895, Nos. 19 and 20, and *Apotheker-Zeitung*, 1896, No. 13.

[*] *Apotheker-Zeitung*, 1896, No. 13.

[†] We do not mean to say that all other substances which may be prepared from the thyroid gland have absolutely no physiological action.

[‡] Treupel, *Münchener med. Wochenschr.*, 1896, No. 6.

[§] Roos, *Zeitschr. f. physiol. Chem.*, Bd. 21, p. 19.

On acidifying the solution filtered from the globulin with acetic acid and then boiling, a heavy coagulum of proteid matter is obtained, which likewise contains iodine and the major portion of the thyroiodin of the gland in combination with it. When this albuminous coagulum is digested with gastric juice, or decomposed by boiling with dilute sulphuric acid (one part of acid to ten of water), the largest portion of the total quantity of thyroiodin existing in the gland is isolated. This second proteid manifests the characteristics of an albumin and exerts marked action upon goitre. If the aqueous extract filtered from the coagulated albumin is evaporated to dryness, the residue remaining will be found to be free from iodine and physiologically inactive. The same result is obtained when, without previous separation of the globulin, the salt-water extract is brought directly to coagulation. The filtrate from this coagulum is found to contain no iodine, and hence has no action upon goitre. In this latter process, then, the *total quantity* of thyroiodin contained in the gland is separated with the proteids. The proteid precipitates obtained in this way may be utilized to advantage in the further separation of thyroiodin by the use of artificial digestion or by boiling with dilute sulphuric acid. By virtue of its slight solubility in water the free thyroiodin of the gland is precipitated simultaneously with the proteids, from which, by boiling with alcohol, it may be extracted.

From these observations, then, it is evident that thyroiodin may be found as such in very small quantity in the thyroid gland; that the greatest part of this substance, however, is combined with albuminous matter, which we call thyroiodin-albumin, and a smaller part is united to a globulin-like substance, thyroiodin-globulin.

2. DETERMINATION OF THE IODINE IN THE THYROID GLAND.

From the standpoint of therapeutics, the fact that thyroiodin is an iodine compound is of the greatest importance, since through it a means is afforded of administering definite doses of the active agent of the thyroid, which, of course, is not possible by the employment of the glands themselves or their various extracts. Our investigations have shown that the thyroid glands of sheep as well as of other animals do not always contain the same quantity of thyroiodin, and we have found, also, that the content of this substance, besides varying very considerably in sheep in general, is essentially different for the sheep raised in different regions. In the experiments previously reported upon, unequal amounts of thyroiodin were obtained in different preparations made by the same method, which fact is explained by these wide differences found to represent the normal content of thyroiodin in the thyroids from sheep.

The method best adapted for the direct quantitative determination of iodine is the one which will permit of the most accurate separation of very minute quantities, since the amounts of that element contained in the portions of the substance of the gland under examination usually are but fractions of a milligram. A few preliminary experiments satisfied us that the colorimetric method recommended by Rabourdin* is best adapted for this purpose. By this method the iodine, after the removal of the associated organic substances by fusion with sodium hydroxide and potassium nitrate, is liberated upon acidification of the aqueous solution of the fused mass with sulphuric acid, and is then immediately separated from the fluid by shaking it thoroughly with a definite quantity of chloroform. After all of the iodine has been absorbed by the chloroform, the mixture is then transferred to a glass cylinder, preferably one about 20 centimetres high, possessing a capacity of 100 c.c. Into another cylinder of corresponding size is placed an equal volume of chloroform colored by the iodine from a known amount of potassium iodide. When the intensity of the color is equal in both cylinders the chloroform in each is colored, of course, by the same amount of iodine.

In order to test the accuracy of this method the following experiments were carried out:

1. One gram of dried fibrin was placed in a silver crucible, and to it was added 5 c.c. of a solution containing 0.1 gram of potassium iodide per litre (0.5 milligram) and 2 grams of caustic soda. After a small quantity of potassium nitrate (0.5 gram) had been added to the mixture, the crucible was cautiously heated until the separation of carbon began. After further addition of small quantities of potassium nitrate the fusion was gradually completed. The fused mass was then dissolved in about 25 to 30 c.c. of water, the solution filtered, cooled, mixed with 10 c.c. of chloroform, acidified with dilute sulphuric acid (1 to 10), and then thoroughly agitated. This fluid was poured into the first of the above-mentioned cylinders, when it was next ascertained just how much of the potassium iodide solution previously used it was necessary to add to the second cylinder, containing 10 c.c. of chloroform and 50 c.c. of water mixed with a little dilute sulphuric acid and a few drops of sodium nitrate, in order to produce a color corresponding in intensity to that in the first. In this case an equally strong coloration of the chloroform in both cylinders was obtained after 4.2 c.c. of the potassium iodide solution had been added to the fluid in the second cylinder. This demonstrates, then, that in the process of fusion 0.08 milligram of potassium iodide was lost.

2. A gram of dry fibrin, after addition to it of 1 milligram of potassium iodide as above described, was fused with caustic soda and potassium nitrate. The quantity recovered in this experiment corresponded to 0.9 milligram of potassium iodide.

In determinations of iodine by the above method, consequently, when the quantities are minute and equivalent to those in the above cases, it is necessary to take account of a loss which corresponds to 0.08 to 0.1 milligram of potassium iodide, or 0.06 to 0.076 milligram of iodine.

The differences in color are most easily distinguished in this method when 10 c.c. of chloroform are colored by not less than 0.2 milligram nor more than 1.5 milligram of iodine. When the amount of iodine is greater the color becomes so intense that small differences are no longer to be sharply distinguished in the cylinders employed. In such cases cylinders of less width must be used or 20 c.c. of chloroform employed; or better still, the experiment should be carried out again with a smaller quantity of the substance (½ or ¼). The experiment must always be repeated when the quantity of iodine in the substance falls below 0.2 milligram. With a little practice very slight differences amounting to only 0.1 milligram of potassium iodide (0.076 milligram of iodine) may be easily recognized.

It will be observed from the foregoing that this method is not an extremely accurate one. Its main advantage lies in the fact that it may be very quickly carried out, and it is particularly well adapted for the approximative determination of the iodine contained in the thyroid glands. When the substance under examination contains only a very small amount of iodine, it is frequently observed that the color of the chloroform mixture soon weakens and then disappears. Consequently, all determinations by this method must be carried out promptly and without interruption. When very small quantities of iodine are being worked with, it is recommended that the iodine be thrown down from the unfiltered aqueous solution of the fused mass, after acidification with dilute sulphuric acid, as silver iodide. The latter may then be reduced with zinc dust and sulphuric acid, and the iodine in the filtered solution determined colorimetrically as above.

---

* *Lieb. Ann.*, 76, p. 375.

3. Content of iodine in the thyroid glands from sheep.

In these researches we used thyroid glands obtained from sheep raised in different regions. Some were obtained in Freiburg (Table No. 1–3), some came from the Wupperthal district (No. 4–5), others were taken from a slaughter-house in Paris (No. 6–7). The latter determinations of iodine in the thyroids from sheep were made from large quantities of prepared glands, for which we are greatly indebted to Bayer & Co., of Elberfeld.

The weight of the individual glands, freed as far as possible from fat during the process of preparation, varied generally between 3 and 5 grams. Glands were frequently found in which one lobe was considerably smaller than the other. One hundred parts by weight of fresh gland gave, in three preparations from different samples of glandular tissue, 28.2 to 30.4 parts by weight of dry substance. The average quantity of the latter amounted to 29.5 per cent.

For the determination of iodine 1 gram of the gland dried at 100° was usually sufficient. When the content of iodine was quite large the experiment was repeated with 0.5 or 0.2 gram of substance. All determinations were duplicated, and it was found that differences in the results were never greater than amounts corresponding to about 0.07 milligram of iodine. A correction for the small loss of iodine consequent upon the fusion process was not made. The results obtained are shown in the following table:

No.	Origin of the thyroid glands.	Iodine content in milligrams	
		from 1 gram of dry gland.	from 1 gram of fresh gland.
1	Freiburg	0.9	0.26
2	"	1.0	0.29
3	"	1.3	0.38
4	Elberfeld	1.5	0.44
5	"	5.3	1.56
6	Paris	1.15	0.34
7	"	1.2	0.35

From these results it is seen that the iodine content of the thyroid glands varies considerably according to the different provinces from which the sheep are obtained. Even when the value found in No. 5 is looked upon as an exceptionally high quantity, which perhaps might not again be duplicated, there yet remain variations running anywhere from 0.26 to 0.44 gram.

In the comparisons made of the activity of thyroiodin with that of the fresh glands, the thyroids collected for the above purpose, were used also for this. A very close agreement in physiological action was obtained when 0.25 to 0.3 milligram of iodine in the form of thyroiodin was administered in the place of about 1 gram of fresh thyroid gland. By reason of the exceedingly small quantities in which thyroiodin must be thrown into the system, it is necessary to employ the same in the form of a triturate. The thyroiodin prepared for us by the dye manufacturers, Friedr. Bayer & Co., of Elberfeld, contained, in 1 gram of the milk-sugar triturate, 0.3 milligram of iodine. The activity of the triturate corresponds to that of an equal weight of fresh gland, which, like the former, possesses a relatively small content of iodine.

It has been found that upon parenchymatous goitre thyroiodin manifests its activity more quickly than do the fresh thyroid glands or the tablets. This circumstance is to be explained by the fact that the splitting off of thyroiodin from the proteids of the thyroid glands during the digestive processes takes place probably only gradually and perhaps only incompletely, and that in the putrefactive processes of the intestines a part of the thyroiodin-albumin is doubtless transformed into inactive products. If an alkaline solution of thyroiodin is treated with sodium amalgam, sodium iodide is formed. The conditions for such a decomposition and transformation are provided also by the intestinal putrefactive processes. Thyroiodin itself, on the other hand, is obviously so quickly absorbed that it is not at all affected by the processes of putrefaction going on in the intestines.

FREIBURG, March 2, 1896.

POSTSCRIPT.—While this communication was being printed, Prof. Ewald apprised me of the fact that he has successfully treated myxœdema with thyroiodin. For permission to add this result here, I convey my heartiest thanks to Prof. Ewald.

BAUMANN.

THE PROTEIDS OF THE POTATO.

BY THOMAS B. OSBORNE AND GEORGE F. CAMPBELL.

So far as we can ascertain, the only investigations of the proteids obtained from the tubers of the potato have been made by Rüling (*Liebig's Annalen*, lviii., 306), Ritthausen (*Pflüger's Archiv*, xxi., 101), Zöller (*Ber. d. Deutsch. Chem. Ges.*, xiii., 1064), and Vines (*Journal of Physiology*, vol. 3, p. 93).

Rüling contributes a partial analysis of the coagulum obtained by boiling the juice of the potato.

Ritthausen states that nearly the whole of the proteid of the potato is contained in the juice. He obtained two preparations from the juice by heating to 65° C., filtering off the coagulum, and heating the filtrate to 76°. The two coagula were analyzed with results as stated beyond. He says: "These results do not contradict the assumption that the potato contains albumin, yet the content in sulphur is only one-half as great as in albumin of serum, egg, and muscle."

Zöller extracted the pressed and washed potato pulp with ten per cent. sodium chloride brine and obtained a globulin, precipitable by saturating its solution with sodium chloride, and when dissolved in ten per cent. sodium chloride brine coagulating on heating to 59° or 60°. From his results he concludes that the potato contains a globulin resembling myosin.

On investigating the juice of the potato, Zöller obtained results which led him to conclude that the proteids therein dissolved are also globulins, but that further study was needed to explain their "peculiar deportment," especially, it is to be inferred, the fact of coagulation occurring at from 43° to 48°, and again at 62°.

Vines states that prolonged treatment of the "crystalloids" of the potato with ten per cent. sodium chloride solution produces an apparent effect, but that they dissolve readily in a saturated solution of this salt, thus differing from all other protein crystals which he had observed.

Having had occasion to prepare a quantity of pure starch from the potato, we took advantage of the opportunity to examine the associated proteids.

After removing the skins, the tubers were crushed and squeezed in a drug press. The juice was strained through cloth and allowed to stand and deposit the greater part of the suspended matters. It was then saturated with ammonium sulphate, and the precipitate so produced was filtered out. The potato pulp was washed with water and the washings after clearing were also saturated with ammonium sulphate. The two precipitates thus obtained were united, dissolved in salt solution, filtered clear, and dialyzed.

The washed pulp was then treated with ten per cent. sodium chloride solution; the proteid, thus extracted, was precipitated with ammonium sulphate, dissolved in salt solution, filtered clear, and also dialyzed. The globulin precipitated very slowly on dialysis, and after fourteen days was filtered out. The proteid obtained from the juice was much greater in amount than that from the salt extract of the pulp. The globulin, from both juice and salt extract, was then dissolved in salt solution, the solutions were united, filtered from a considerable quantity of insoluble globulin (rendered insoluble by long contact with water), and the solution again dialyzed. After freeing from chlorides, the contents of the dialyzer were filtered, the reprecipitated globulin was washed with water and alcohol and dried over sulphuric acid, giving preparation **1**, weighing 7.34 grams.

The filtrate, from preparation **1**, still contained proteid and was therefore saturated with sodium chloride, which completely precipitated the remaining globulin. This was then dissolved in dilute salt solution and dialyzed in water until free from chlorides and, as the proteid was not thus precipitated, the dialyzer was transferred to alcohol, which soon threw down all the proteid. This was filtered out, washed in water and absolute alcohol, and dried, giving 0.5 of a gram of preparation **2**.

The solutions, filtered from the globulin precipitated by the dialysis first described, were united and, in order to obtain the proteid in a solution of smaller volume, the liquid was saturated with ammonium sulphate, the precipitate produced was dissolved in a little water and the clear solution dialyzed, first in river-water and then in distilled water. The globulin so precipitated was filtered out, washed with water and absolute alcohol, and dried, yielding preparation **3**, weighing 3.40 grams. The filtrate from this preparation was dialyzed into alcohol and the resulting precipitate filtered out, washed with absolute alcohol, and dried, forming preparation **4**, which weighed 1.74 grams.

The filtrate from **4** was further dialyzed in alcohol and the proteid completely precipitated by adding absolute alcohol. This substance after filtering out, washing with absolute alcohol, and drying, weighed 0.53 of a gram and formed preparation **5**.

These several preparations were analyzed, after drying them at 110°, with the following results:

POTATO GLOBULIN. TUBERIN.

	Osborn and Campbell					Ritthausen.	
	1	**2**	**3**	**4**	**5**	I	II
Carbon	53.62	....	53.58	53.64.	....	....	53.87
Hydrogen	6.80	....	6.91	6.83	....	....	7.30
Nitrogen	16.15	16.29	16.36	16.34	16.07	15.76	15.98
Sulphur	1.22	....	1.27	23.19	....	....	0.89
Oxygen	22.21	....	21.88				21.99
	100.00		100.00	100.00			100.00

The close agreement in composition among our five fractions is in itself strong evidence that, besides this globulin, but little proteid is present in the potato. These five fractions practically include the whole of the proteid matter dissolved in the juice and salt extracts. The above figures given by Ritthausen for the composition of the proteid, obtained by coagulation of the juice at 65° and 76°, are also in close agreement with ours, excepting those for sulphur. The slightly lower nitrogen content of the coagulated globulin is to be expected, since proteids generally, if not always, yield some ammonia when coagulated by heat.

The potato globulin, when heated slowly in a double water-bath, shows a wide range of variation in its coagulation point depending on the conditions under which it is dissolved.

A solution of this globulin prepared by treating a portion of preparation **1** with 10 per cent. sodium chloride solution and filtering out the insoluble matter, became turbid at 56°, and a flocculent coagulum separated at 64°. After heating some time at 70° the coagulum was filtered out and the filtrate, when again tested, gave a turbidity at 72° and a flocculent coagulum at 76°.

Another preparation of this globulin was extracted, in the same way, with 10 per cent. salt solution, and the dissolved proteid was filtered from the insoluble matter and precipitated by saturating the solution with sodium chloride. The precipitated globulin was washed with saturated salt solution and removed from the paper mixed with a considerable quantity of the concentrated brine. Distilled water was gradually added until all of the proteid dissolved. The resulting solution was therefore almost completely saturated with the proteid. This solution when slowly heated in the double water-bath to 44° C. and held at this temperature some minutes, became turbid and after a time flocculent, although the temperature remained perfectly constant. After raising the temperature to 50° it was filtered from the small coagulum which had formed and again heated, turbidity occurring at 50½ and flocks separating at 51°. After heating some time at 56° the solution was filtered from the second small coagulum and again tested. Turbidity occurred at 58° and flocks separated at 59°, gradually increasing to a large coagulum at 66°, which was filtered out. The filtrate now became turbid at 63°, flocks forming at 66°, and increasing to a considerable coagulum at 70°. The temperature was raised to 80°, and the coagulum, which was about the same in amount as that formed at 66°, was filtered out. The filtrate gave only a trace of coagulum on boiling. The two coagula first formed were very small compared with the last two.

This test was then repeated with the same solution diluted with an equal volume of water. This solution was heated for some time at 44°, but remained perfectly clear. The temperature was then very slowly increased, and at 53° a turbidity formed which, however, was scarcely greater at 56°. Above this temperature the turbidity increased until flocks separated at 62°, and a large coagulum formed at 65°. The solution filtered at 66°, gave a turbidity at 66°, with flocks at 68°, which formed a large coagulum on gradually raising the temperature to 80°, the filtrate from which gave no more coagulum on boiling.

The test was again repeated by mixing four parts of the same solution with one of water, and the same results obtained as with the solution diluted with an equal volume of water. This shows that within wide limits the temperature of coagulation does not depend on the relative quantity of dissolved proteid, but that the very low coagulation point of the undiluted solution was probably due to the presence of nearly enough sodium chloride to cause precipitation of the globulin. It will be noticed that coagulation of the proteid, which began at 56°, was not completed until the temperature had reached about 80°. This does not necessarily show the presence of several proteids, for such gradual coagulation is characteristic of most plant globulins, many being only very slowly coagulated, even by long boiling (Chittenden and Mendel, *Jour. Phys.*, xvii., p. 52). The coagulum separated by heating solutions of this globulin to 75° C. is very soluble, on gently warming, in extremely dilute hydrochloric acid, even acid of $\frac{1}{100}$ per cent. dissolving the substance readily at 40°–50° C. The coagulum dissolves quickly and completely in $\frac{1}{10}$ per cent. caustic potash solution at 20° and in one per cent. sodium carbonate solution at 70° C. These solutions are precipitated by neutralization, but the substance thrown down is not soluble in salt solutions. The low heat-coagulation point obtained for the solution of the globulin precipitated with salt and dissolved in a minimum quantity of water is in accord with that given by Zöller for the proteid similarly obtained by him from the juice of the potato, and our observations explain to some extent the questions which he considered to require further investigation.

In order to determine more definitely whether other proteids were present with the globulin, a larger quantity of filtered potato juice, obtained from potatoes which had been washed carefully, but from which the skins had not been removed, was saturated with ammonium sulphate, the precipitate was dissolved in dilute salt solution, which was then filtered and saturated with sodium chloride. The globulin thus precipitated was filtered out, the filtrate was dialyzed for twenty-four hours in order to remove a considerable part of the salt, and was then saturated with ammonium sulphate. The small quantity of proteid thus precipitated was filtered out, dissolved in a little dilute salt solution and sodium chloride added to complete saturation. A considerable part of the dissolved proteid was thereby precipitated, which was filtered out and dissolved in dilute salt solution. The resulting liquid became turbid on heating to 58° C. and flocculent at 60°. The substance was evidently a part of the globulin which had escaped precipitation on the first saturation with salt, probably owing to the presence of some constituent of the juice.

The solution filtered from the salt saturation precipitate *last* described was diluted with two volumes of water and then saturated with ammonium sulphate. The proteid thus separated was filtered out, dissolved in water, and found to yield a turbidity at 52° and a flocculent coagulum at 58°, a coagulation point not essentially differing from that of the globulin.

The whole solution was then heated for some time at 70° C. in a water-bath, the coagulum which separated was filtered out, and the filtrate, after removing a small quantity of coagulum, which separated on heating to 75°, was boiled and found to remain clear. This solution was then saturated with ammonium sulphate and the very small precipitate produced was filtered out, dissolved in a small amount of water, and tested with the following results: nitric acid added to the solution in the cold gave no precipitate; saturation with sodium chloride gave no precipitate even when acetic acid was added. The biuret test was without result owing to the strong brown color of the solution. This substance therefore failed to give the most characteristic reactions of the proteoses, yet it must be considered as a proteose since in its essential properties it agrees more closely with this class of proteids than with any other.

The experiments made by Zöller on the juice of the potato were repeated by us with the same results as described by him, except that we found the solution of the precipitate produced by saturation with salt to yield a flocculent coagulum at 52°, while Zöller's solution coagulated at 46°–48°. It has already been shown that a solution of the globulin similarly prepared gave a coagulum at 44°, and on dilution with one volume, as well as with one-fourth volume of water, the same solution coagulated at 62°. It is thus evident that the temperature of coagulation is not to be depended upon as a means of identifying this proteid with certainty. The other reactions described by Zöller are those given by the potato-globulin. From these results, then, it would appear that by saturating the juice of the potato with sodium chloride the greater part of the globulin is precipitated, but that a not inconsiderable part remains in solution. If this is separated by saturation with ammonium sulphate and the precipitate so produced is dissolved in water, a large part of this globulin can be precipitated by again saturating with salt. The proteid still remaining in solution is nearly all coagulable and the solution on heating behaves exactly like a solution of the globulin.

CONCLUSION.

The proteids of the potato tuber consist of a globulin, for which we propose the name *Tuberin*, and a proteose, the latter occurring in very small amount. The properties of tuberin were found to be as follows:

It is precipitated by saturating its solutions with sodium chloride, sodium sulphate, magnesium sulphate, or ammonium sulphate. By acetic acid or nitric acid a precipitate is given readily soluble in an excess of acid even in the presence of salts. Potassium ferrocyanide gives no precipitate until acetic acid is added. Mercuric chloride gives no precipitate, but picric acid or tannic acid throw down the globulin. With the biuret, Millon's, and the xanthoproteic tests the usual reactions are given.

Tuberin is soluble in very dilute saline solutions and therefore the juice of the potato contains the greater part of this proteid. By dialysis it is precipitated slowly and incompletely because of the difficulty of removing *all* soluble salts by this process. Like other easily soluble globulins it readily changes to the insoluble modification, so that preparations made by dialysis are to a great extent insoluble in saline solutions. In contact with alcohol it very quickly loses its solubility.

When dissolved in ten per cent. sodium chloride solution tuberin shows a somewhat variable heat-coagulation point, depending on the conditions under which it is tested. In general a flocculent coagulum is formed on heating to 60°–65° C. Coagulation is, however, not complete until the solutions have been heated for some time at 80° C. The composition of this globulin was found from an average of several accordant analyses to be:

TUBERIN.

Carbon	53.61
Hydrogen	6.85
Nitrogen	16.24
Sulphur	1.25
Oxygen	22.05
	100.00

—*Conn. Exper. Sta. Rep.*

Department of Hygiene.

WITH SPECIAL REFERENCE TO STATE AND PREVENTIVE MEDICINE.

Edited by E. O. SHAKESPEARE, M.D., PH.D.,

(PHILADELPHIA.)

DR. SHAKESPEARE RESIGNS.

To the publisher and proprietor:

IN terminating, on the eve of a somewhat protracted sojourn in Europe, my editorship of the Department of Hygiene and Preventive Medicine, I venture to express, in the interests of the public health, the hope that the policy which has been vigorously pursued during the three years of my editorship, especially towards the extermination of the so-called milk-borne and water-borne diseases, may become a fixed policy of your influential periodical.

Incessant, energetic warfare against the carelessness, ignorance, and cupidity which convert wholesome milk and pure water into carriers and disseminators of disease; persistent, unrelaxing effort to prevent the spread of infection, by scattering broadcast among the people practical knowledge of the mode of transmission and means of prevention of disease: these are maxims which represent in brief the major part of the mission of any modern journal of hygiene and preventive medicine which has a valid *raison d'être.*

Yours truly,
E. O. SHAKESPEARE.

PHILADELPHIA, May 25, 1896.

THE CAUSE OF MALARIA.*

By SURG.-LIEUT.-COL. E. LAWRIE, M.B.,

RESIDENCY SURGEON, HYDERABAD.

[AFTER some preliminary remarks, the lecturer showed a case of recurring malarial fever, with enlarged spleen, in whose blood Laveran's bodies were found. Criticising the figures of these bodies, which have appeared in English medical journals and in other works, he characterized them as "fanciful pictures"; some of them being "drawn from the imagination, others," he said, "especially the rosette form, are caricatures of vacuoles and disintegrating blood cells." Others he considered as being "probably crenating red cells." "It is not surprising," he continued, "that the theories of malarious fever, founded upon the assumption that Laveran's bodies are animal parasites living in the blood, are fantastic and fine spun." After a brief sketch of some of the more salient features of the modern doctrine of malarial disease, Dr. Lawrie proceeded, in the following words, to give his own views as to the nature of Laveran's bodies:]

Healthy blood contains two kinds of cells, the red and the white. The red cells convey gases to and fro between the lungs and the tissues. Their functions are urgent and all-important, and admit of no interruption or relaxation. Hence, among other marvellous qualities, they possess an elasticity which is absolutely perfect; nothing stops their career, and they dash through the narrowest channels, round the sharpest corners, and past obstacles of any and every kind without the smallest check or hindrance. The mobility, energy, and outward activity of the red cell give it the stamp of what Drummond calls "maleness"; it is an organism principally concerned with nutrition. The white cells are very different from the red; when fully developed they appear to me to be filled with granules, which are minute living protoplasmic cells, and many of them contain large clear spaces, hitherto regarded as nuclei, which must, in my opinion, either be fertilizing or nutrient areas; most likely they hold reserves of protoplasm. I throw it out as a hint to the profession that they supply the blood and all the tissues each with the particular kind of protoplasm and young protoplasmic cells suitable for its own special requirements. They incorporate in their own being the two main activities of all living things, nutrition and reproduction, and their internal activity or passivity, and the fact that they teem with young cells and granules indicates that they are the female, in the sense of being the maternal cells of the blood. The white cells are never in a hurry like the red; they loiter about in the capillary system, and stick to the walls of vessels and pass through them, shedding their contents either in the blood or in the tissues. The white cells have special movements of their own, which consist of varied activities of their protoplasm. These cause the cell itself to change its shape and position, and they produce intracellular movements of the granular contents, which are seen sometimes moving slowly, and at others actively "swarming" with the identical movement described by Laveran in connection with his malaria bodies as that of the "disturbance of boiling water."

---

* Extract from an address delivered at the Grant Medical College, Bombay, April 4, 1896.

The white cells of the blood further have the power of throwing out pseudopod processes which, if thread-like or filamentous, are called cilia or flagella, and these protoplasmic offshoots can be detached, and lead for a time an independent existence. The ordinary forces of the circulation, the heart and the elasticity of the vessels, are not sufficient to account for the whole of the movement of the blood in the capillaries, and it seems, therefore, highly probable that both the intracellular circulation called "swarming" and the evolution of "pseudopoda," which is a primitive force of the circulation, are what Pettigrew long ago described as those occult forces which regularly assist in the peculiar circulation of the blood cells and of the blood plasms in the capillary system.

A most important point, bearing on the origin of Laveran's bodies, is the source from which the blood cells are derived. They are largely manufactured or elaborated in the spleen or liver. In man the red cell is not nucleated, but in the human embryo it is nucleated, and it is also nucleated in the frog, and in the frog the nucleus is clearly the intracorpuscular stage of the white cell.

I was led to make an examination of the blood of the frog by an accident. In accordance with letter No. 3278 from the Government of India Foreign Department to the Resident at Hyderabad, covering a paper by Dr. Patrick Manson on the "Nature and Significance of the Crescentic and Flagellated Organisms in Malarial Blood," the medical officers serving under the orders of the Resident at Hyderabad were directed to make observations on the "organisms of malaria, and were specially enjoined to pay particular attention to the life history of the parasite." At the time this letter was received in my office we had been working for several months at the microscopic appearances of the blood in malaria, and it appeared to me that before Laveran's bodies could be properly assumed to be parasites they must be shown to have an independent existence outside the human body, and that a likely *habitat* for them, if they had such an existence, would be the body or the blood of frogs, frogs being known to flourish where malaria abounds. The examination of the blood and of the liver and spleen of frogs was undertaken while the animals were alive (anæsthetized). In the blood and in the free protoplasm of the liver and spleen we discovered, to our astonishment, not Laveran's bodies, but their perfect and complete analogues. In the liver and spleen of frogs were found small protoplasmic cells and granules, identical with those contained in the white blood cells in man, "swarming" with the same movement of boiling water which Laveran had discovered in his organisms, and which we had discovered in the leucocyte. We also found blood cells in every stage of development, and the white cell could be traced from its origin as an intracorpuscular body, when it sometimes becomes the nucleus of the red cell and at others becomes a free and independent leucocyte, until it changes into an extracorpuscular body by bursting through and incorporating with itself the red cell. The white cell in the frog has to serve the purpose of nutrition of a simple slow, cold-blooded amphibious animal, and the processes of its development are correspondingly simple, and easy to follow.

In man the blood cells are unquestionably formed on the same lines as those of the frog, but the nutritive processes are so complex and the difficulties of examining the blood glands during life are so insuperable that it is correspondingly difficult to follow the stages of the developmental processes. It is a curious fact, however, that wherever difficulty arises in tracing out the analogy between the two assistance is afforded by Laveran's bodies.

Lastly, the "swarming" movement of the protoplasm and of the young protoplasmic cells in the spleen of the frog indicate that there is a double circulation in that organ, and very probably in the liver also. This view receives confirmation from the discovery of Roy, extended by Schäfer and Moore, of the rhythmic contractility of the spleen. I mention this here because the double circulation in the spleen may turn out to have an interest bearing on the diurnal variations of the temperature in health, as well as on the periodicity of malarious fever when those variations are exaggerated.

In the light of the above physiological facts we are in a position to consider the actual value of the characteristic features of Laveran's bodies, which have been made the foundation for the belief that they are parasites living in the blood.

1. They are intracorpuscular in one stage of their existence. But the white cells of the frog's blood, which are the analogue of the human white blood cell, are at one period of their existence intracorpuscular bodies, and no one would dream of calling them parasites.

2. Laveran's bodies are at another stage of their life extracorpuscular. So are the white cells of the blood.

3. The free body changes its shape and becomes oval or crescent-shaped. The crescent is supposed to be a parasite and to "devour" the red blood cells. There is nothing remarkable about the change of shape of the crescent. All cells which contain granules tend to become spindle-shaped when the granules collect in the centre of the cell, and round again when they spread out to the margin, and the red blood cell of the frog in which the granules of the nucleus are collected in a compact mass in the centre is itself spindle-shaped. The resemblance between the red blood cell of the frog and the crescent is so marked, especially when the latter is changing its shape, that it cannot be accidental. The true semilunar shape which the crescent assumes is certainly very curious and interesting; but it only takes this shape when the granules are collected quite in the centre, and the cell is consequently very markedly spindle-shaped as a mechanical result of the force of the blood current. If you apply the methylene blue stain to a preparation of fresh blood first to one side of the cover-slip and then to the other, so as to create currents in opposite directions, you can make the crescent semilunar in either direction in which the ends are wafted by the current created by the stain.

4. The granules in Laveran's bodies occasionally undergo a "swarming" movement, which Laveran compared to "the disturbance of boiling water." The same movement was discovered by us in the normal human leucocyte, and it can readily be produced artificially. The importance of this "swarming" movement cannot be overestimated. From the moment when we found swarming in the leucocyte it became clear that Laveran's bodies and the white cells are closely allied, and that one is no more likely to be a parasite than the other. "Swarming" is, confessedly, one of the most characteristic attributes of Laveran's

bodies; it is a sign of life. The "swarming" movement, therefore, the boiling-water movement of Laveran, on which the plasmodists rely most confidently for the identification of Laveran's bodies as parasites, if it is conclusive evidence of anything, is merely evidence that they are related to the white cell. The proof is clinched by the discovery of the same swarming movement in the normal protoplasmic cells and granules in the liver and spleen of frogs.

The same thing may be said with regard to the development of cilia or flagella in connection with Laveran's bodies. In view of the elementary truth that ciliary and flagellate varieties of pseudopods are known to be present and to constitute normal forces in the circulation in plants and animals, there does not appear to be any reason why they should be described as signs of parasite life only when they occur in connection with Laveran's bodies in the fever blood of malaria.

We now see that none of the qualities of Laveran's bodies warrant the assumption that they are parasites. On the contrary, they have their complete analogues in the cells of the blood both of man and of animals. Moreover, they are not present in the blood in a considerable proportion of cases of malarious fever of the most fatal and chronic types. They cannot therefore be the cause of the fever. If Laveran's bodies were the cause of the fever in malaria the plasmodists would surely have been able before now to isolate them in pure culture and to demonstrate their existence outside the human body. Dr. Patrick Manson states that "the intravenous injection of blood containing this parasite into a healthy individual is followed by the multiplication of the parasite in the blood of the person inoculated, and also by the occurrence of the characteristic fever." There can be no justification for employing intravenous injections of malarial blood in the human subject, but during our investigation we did employ them repeatedly in dogs and in monkeys. When they produced any effect at all it was to give rise to a sharp attack of fever, which passed off on the same day, and was not accompanied by the formation, much less by the multiplication, of Laveran's bodies in the blood. According to my experience, which is, however, confined to cholera cases, the intravenous injections of healthy blood or of saline fluid produce similar effects in man. They give rise to ague and fever, but the symptoms so produced by the saline fluid are most assuredly not malarial. From an examination of a very large number of spleens and livers of frogs, which are always healthy, we have come to the conclusion that frogs are immune against malaria. We therefore fed one of our fever patients for several days on the spleens and livers of frogs, and gave him daily subcutaneous injections of frog's serum.

This treatment had no effect in arresting the attacks of fever, as it might have been expected to have had if the cause of the disease had been (*a*) a parasite in the blood against which the frog is immune, or (*b*) a defect in the spleen of the same nature as those defects of the thyroid gland which produce diseases which can be remedied by thyroid feeding.

Enough has been said to show that Laveran's bodies are not animal parasites living in the blood. The relationship between them and the normal blood cells makes it perfectly clear that in every phase of their existence Laveran's bodies have their analogue in normal blood We have dealt with three forms of blood cells:

(*a*) Those of the frog, in which development is slow and easy to follow.

(*b*) Those of the healthy human subject, in which development is so rapid that it is difficult to trace except in the way of analogy with the frog.

(*c*) Those of the malarious human subject (Laveran's bodies), which are diseased or degenerate, but in which the development is not so rapid as in the healthy human blood cells, and in which the analogy to normal human blood cells on the one hand and the frog's blood cells on other can be traced without difficulty.

A study of Laveran's bodies renders many points in the physiology of the blood clear and distinct. Thus, their intracorpuscular stage indicates that the human white blood cell begins life as an intracorpuscular body. The extracorpuscular stage is synonymous with the free and independent existence of the leucocyte. The crescents indicate the spindle shape of the red cells, which is normal in the frog and other lower animals; and the swarming movement and the development of ciliary or flagellate pseudopods affords strong presumptive evidence that these circulatory forces, which are recognized conditions of the circulation in animals and plants, are regularly at work in the capillary system of man.

It only remains to state or reaffirm the source of origin of Laveran's bodies and to consider the theories of malarious fever based upon it to the extent to which it is warranted by actual facts. The spleen is undoubtedly the organ mainly concerned in the production or elaboration of the white blood cells, though other blood glands may assist in the process. We have just seen that the analogy between Laveran's bodies and human blood cells as well as those of the frog, which are manufactured in the liver and spleen, is close and absolute, and in the third place the spleen is invariably diseased in malarious poisoning. From these three facts it is evident that the Laveran's bodies are mostly the kind of degenerate blood cells which are turned out by the spleen when it is dragged down from its high pinnacle of evolution by malaria. The precise manner in which malaria acts upon the spleen can only be determined by future observation. All we know at present is that in certain localities and climates which we call malarious enlargement of the spleen with fever and anæmia is endemic, just as we know that in other localities and climates enlargement of the thyroid gland with bronchocele and various constitutional symptoms, and in others again stone in the bladder, are endemic.

Our theory of malarial fever, then, is that it is produced by the action of malaria on the spleen, and that the production of Laveran's bodies, which are not found in anything like all cases of malarial fever, is one of the effects of the distempered condition of the spleen—of splenitis. Several facts point irresistibly to this conclusion: for instance, congestion of the spleen characterized by enlargement or tenderness, or both, is the most constant of all the symptoms of malarious poisoning. Secondly, it is the sign on which reliance may most safely be placed in making the diagnosis of the malarial origin of fever, and if it is not present it is generally well to consider the advisability of excluding malaria as the cause. In the third place, the only drug which can be trusted to cure enlargement of the spleen from malaria and the fever which springs from it is quinine, and it restores equally those cases in which Laveran's bodies are and those in which they are not found in the blood. Lastly, when Laveran's bodies are present they attest in terms which are unmistakable that the spleen is the organ primarily affected by malaria.

The first effect of malaria on the spleen is to disorder its functions, and the patient gets fever, sometimes markedly periodic, sometimes not. It must not be forgotten that the temperature of the blood in health shows regular diurnal variations between 97° and 99°, which depend to a large extent upon the periodic nocturnal inactivity and the diurnal activity of the spleen. The periodic attacks of fever are amply accounted for by the view that they are exaggerations of the diurnal activity of the spleen. The disturbance of its functions may cause the diurnal variations to be exaggerated daily—quotidian ague, or every alternate day—tertian ague, or every third day—quartan ague. As the disorder of the spleen increases its functions of regulating the diurnal variations of temperature become less clearly pronounced, they are as it were lost in the disease, and as a consequence the attacks of fever seldom maintain periodic regularity for any length of time, and they become irregular. If the irritation of the spleen is very great, or if it is accompanied by derangement of important organs like the brain, the liver, the stomach, or the bowels, the fever may be irregular or continuous from the onset.

As the disease progresses the spleen is no longer able to elaborate its full complement of perfect white cells. It manufactures a certain number of imperfectly developed or abnormal cells, which pass into the blood, and these are Laveran's bodies. The symptoms produced by the presence of these bodies in the blood are easy to understand; they are symptoms of disordered nutrition. Instead of receiving their normal supply of life-giving white cells all the tissues of the body get a proportion of Laveran's barren innutritious and not infrequently lifeless organisms. It is not surprising that a patient who has malarial fever is generally pale, and has headache or perhaps severe cerebral symptoms, with indigestion, constipation, and derangement of the liver, or that he feels very ill and becomes thin; the nutrition of every tissue and organ in the body suffers. Finally, when the enlargement of the spleen becomes, as we say, chronic, its functions as a blood-forming organ are entirely in abeyance; even the degenerate cells of Laveran are no longer produced and the anæmia becomes permanent and profound.—*Brit. Med. Jour.*

SOME EXPERIENCES WITH THE BACTERIOLOGICAL DEPARTMENT OF THE PHILADELPHIA BOARD OF HEALTH.

By William Duffield Robinson, M.D.,
of Philadelphia.

The following cases which have recently occurred in my practice illustrate some interesting and unexpected results of bacteriological examinations in cases of sore throat.

On December 7 I was called to see Mrs. G. M., wife of the paying-teller of one of the banks of this city. She complained that she had taken cold, and for two or three days had felt chilly, with general bodily pains. She also said that she "had swallowed a piece of orange-peel which had gotten behind her palate," that she was unable to dislodge it, and that it caused her distress. At the time of my visit the patient was in the dining-room, her little three-year-old girl being on her lap. I found the temperature to be 104⅕°, pulse 138, tongue coated, but on careful investigation could find no orange-peel nor other foreign substance in the locality indicated by the patient. There was, however, over both tonsils, and on the pharynx, quite an exudate, of whitish character, and not perceptibly elevated; it had not at all the appearance of "dirty chamois skin stuck on the parts," said to be characteristic of true diphtheria. The patient did not complain of soreness of the throat, and there were no nasal symptoms. A culture tube was procured, and specimens taken from the exudate were sent to the Bacteriological Department of the Board of Health. Treatment was then begun, consisting of tincture of chlorid of iron, and bichlorid of mercury, and sulphate of quinin, internally, and the throat was treated every two hours by being first cleaned with a hot gargle of weak salt water, then with a gargle of dilute peroxid of hydrogen, and by having trypsin freely blown on the affected parts after each treatment. The patient had been but little among outside people and knew of no exposure to diphtheritic poison. The case did not seem to present the characteristics of true diphtheria, but the husband and children were at once isolated pending the report of the bacteriological examination. This report, received the next day, stated that the culture contained Klebs-Löffler bacilli, and that the case was, therefore, one of true diphtheria. Cultures were then immediately made from the throats of the husband and of the three children, aged respectively three, seven, and nine years; and their strict isolation was continued. The report from these cases was that all the cultures, except from the youngest child, contained the Klebs-Löffler bacilli.

At this time each of these four persons was to all appearances, and by all tests that could be made as to pulse, temperature, condition of the throat, and general feeling, in perfect health. Nevertheless, their isolation was still enforced in order to avoid contagion from the mother, they having been removed from the house as soon as the nature of her disease was ascertained. Detailed examination of each person was made each day and they all continued in apparently perfect health until the seventh day after the first culture of the exudate had been made, when the husband was taken with chill, followed by temperature 103⅜°, pulse 140, and rapidly developing exudate on pharynx and right tonsil. The exudate had developed between the afternoon and my visit at 10 o'clock next morning, and practically covered one-half of the surface of the right tonsil and pharnyx. In the children the temperature and all the apparent conditions remained normal, and they were separated from their father by his returning to his home. Another culture was made from the father's throat and the Klebs-Löffler bacilli were again reported.

On the second day following, being the ninth day since the children had been separated from their mother, the boy, aged seven, and on the tenth day of their isolation, the girl, aged nine, almost identically reproduced the symptoms which had appeared in the father—chill, high temperature, throat exudate, with duplication of the report of Klebs-Löffler bacilli from the Bacteriological Department.

Briefly stating the treatment in these cases, I would say that of Behring's antitoxin, No. 3, a full bottle was injected into the thigh of each patient. The activity of the disease was recognized about 10 A.M., and the injections were made about 3 P.M. of the same day. A marked improvement was manifested in each of these cases in twenty-four hours, the boy's throat having cleared, and the temperature in no case being higher than 99⅜°. At the end of forty-eight hours each of these patients was practically well, with normal temperature, and clean throat, simply showing a little redness, which passed away within the next twenty-four hours. The bacilli continued to be found for the next four or five days in the boy, for ten days in the girl, and for fifteen days after the disappearance of the exudate in the father's case.

The three-year-old child, although much more exposed to the contagion of her mother's breath than any of the other members of the family, from having slept with her, remained perfectly well, was returned to her home after its disinfection, now more than three weeks ago, and has had no diseased symptoms, nor has bacteriological examination discovered any diphtheritic bacilli in her case. Repeated examinations of the throat of the nurse who had charge of these cases failed to show any trace of the bacilli, and she left the house in perfect health.

Any physician can readily appreciate how difficult it was to keep this gentleman away from his business while he was feeling in such perfect health during the week of incubation and the two weeks following his apparent recovery, while the bacilli continued to be found. Especially was this the case because there were only about three days during the activity of the disease that he experienced even a slight indisposition. It is also manifest what a terrible source for the distribution of contagion he would have been in his position as paying-teller, handing money to hundreds of persons daily, with fingers often moistened with saliva laden with the disease-bearing germs.

These cases illustrate, from the positive side, the value of bacteriological examination in cases of sore throat, even where diphtheria may be not at all suspected showing, as they do, how this process can detect the presence of the disease even where there are no other indications of its existence, nor, indeed, of any ailment whatever.

The next case may be regarded as of a negative character, showing how the bacteriological examination contraindicated the presence of diphtheria in a case where all the symptoms and circumstances seemed to affirm its presence, and how the accuracy and trustworthiness of the bacteriological method were demonstrated by the results.

Mrs. G., the mother of two children, one aged fifteen months and the other four years, called me in. I found a history of chill, temperature 104⅕°, pulse 136, glassy eyes, and every indication of toxæmia. An examination of the pharnyx revealed an exudate similar to that described as characteristic of diphtheria. It was in color a dirty-looking, yellowish white, and appeared as if the spots had been pasted upon the pharnyx and tonsils, covering one-third of all the parts visible back of the soft palate by compression of the tongue. A week previous to the beginning of her illness the patient had attended the funeral of a child who had died of diphtheria, the diagnosis in that case having been confirmed by bacteriological examination. Subsequently to the child's death, two dolls which had belonged to her were sent to patient for the amusement of her children. One of these dolls was much soiled, and had been much handled by the dead child during her last illness. Patient had handled the dolls herself a good deal to amuse her children, and the history of the case, therefore, gave excellent reason for suspecting contagion. On the first day a culture was made from her throat, before any antiseptic remedies had been used, and was sent to the Bacteriological Department for examination. Feeling confident that all the symptoms and the history of the case proved it one of true diphtheria, I began active, local, and constitutional treatment, withholding, however, the antitoxin until I should have received the report of the results of the bacteriological examination. In order to get this report as soon as possible, I had arranged with the examiner that it be sent me by special messenger immediately on completion of the examination. It was received about noon, and, to my surprise, it was to the effect that the examiner had been unable to find any Klebs-Löffler bacilli, and that the department, therefore, could not, from a bacteriological standpoint, pronounce the case one of true diphtheria. They, however, requested that another culture be made, and that the case be carefully isolated, pending a repetition of the examination. This second and a third closely consecutive examination still failed to show the presence of the characteristic bacilli, and no antitoxin was injected. The woman entirely recovered in a few days, and the children have remained free from the slightest illness now for more than four weeks since their mother's recovery.

The next case is of a different class, but is pertinent in this connection as showing the accuracy of the bacteriological method, and its value in sometimes revealing the existence of a disease whose presence there are no other grounds for suspecting.

G. B., male, aged thirty-four, by profession a vocal musician; never of very vigorous health, and with a history of having had pneumonia six years and two years ago; was, after two years of good health, taken with a chill, very high temperature, rapid breathing, and great pain in lower part of left lung, apparently pleuritic in character, extending in modified form over much of the lung. Within twenty-four hours he began to spit, after coughing, a clear, colorless, tenacious substance, roughly mixed with a substance like freshly clotted blood. There was some dulness over the affected side on light percussion, with harsh bronchial breathing. In a modified degree the same condition prevailed in the other lung. The case was diagnosed as probably one of pneumonia rapidly progressing, and a specimen of sputum was immediately sent to the Bacteriological Department to confirm, if possible, this diagnosis by the detection of the pneumococci, the characteristic micro-organism of pneumonia. The report was that no pneumococci had been found in the sputum, but that many tubercle bacilli had been discovered. The examination was repeated, with the same results. As the young man had not been ill for two years, and there had been no evidence of reduced physical vigor previous to his acute attack, this report was indeed surprising, and especially so in view of the acute symptoms then present. It was but eight or ten days, however, before the correctness of the bacteriological diagnosis was proven by the unmistakable evidences of an unusually rapid form of miliary tuberculosis, from which the patient has sunk with remarkable rapidity. At the present writing (five weeks since the first bacteriological examination of his sputum) he is practically moribund, it seeming impossible that he can live beyond twenty-four to forty-eight hours. The evidences of the ravages of the tubercular process have been characteristic and very plain. —*Med. News.*

CROUPOUS PNEUMONIA DUE TO CONTAGION OR DIRECT TRANSMISSION OF THE INFECTIOUS MATERIAL.

By George H. Weaver, M.D.

That croupous pneumonia is at times contagious and transmitted directly from one person to another has been insisted upon by numerous writers in various countries, and their opinions have been substantiated by closely observed clinical facts. Still the authors of our standard text-books on the practice of medicine, if they refer to the subject at all, seem inclined to doubt such an occurrence. Many well-marked epidemics of pneumonia have been observed. In such instances the large number of cases occurring in a single prison, barrack, or locality can only be explained by the presence of a common source of infection, by a transfer of the infectious agent from individual cases to others by unhygienic conditions affecting alike all the persons attacked, or by a combination of all these factors. While it is probably true that unhygienic conditions, chilling of the body, general depression of the system from preceding sickness or fatigue, etc., render the individual more susceptible to the virus of pneumonia, it is not so easy to state when the infectious agent enters the body or from whence it comes. It is generally admitted that the cause of most cases of acute croupous pneumonia is the pneumococcus described by Fraenkel[*] and Weichselbaum.[†]

The micrococcus lanceolatus (pneumococcus of Fraenkel) is found in the upper air-passages and mouth of a considerable proportion of healthy individuals.[‡]

The theory has been advanced that under conditions which lower the vital resistance of the body to it or increase its virulence, the micrococcus lanceolatus, already present, becomes pathogenic for the individual and causes pneumonia or some other disease process. It would be at least as logical to suppose that under the action of the various agencies which render the individual susceptible to pneumonia, if virulent specific bacteria be introduced into the mouth or upper air-passages from without the body, the disease would be caused. It is well known that the micrococcus lanceolatus is particularly virulent when obtained directly from the body of the diseased animal. The transmission of the bacteria may be readily accomplished in different ways. Bordini-Uffreduzzi (*Centralblatt f. klinische Med.*, No. 17, 1892) found that pneumonic sputum, which had been inspissated from exposure to diffuse daylight for from nineteen to forty-five days, retained its property of producing typical septicæmia when injected into animals. Exposure to direct sunlight for twelve hours lessened the virulence of the sputum, but did not destroy it. In dried and pulverized sputum the organisms might be readily carried to the nose, mouth, and pharynx in inhaled dust.

In other instances the infection may be carried directly to the mouth or nose by the hands, cloths, etc., soiled by sputum. In the first of the cases we observed, the former method is most probable. In the second case it is most likely that the wife carried the infection to herself upon her fingers or upon the cloths soiled with expectoration with which she would wipe her own face. In most of the instances reported as examples of contagion in pneumonia, the resistance of the one secondarily affected had been reduced in some way, most often by the fatigue from long watching and nursing. In the first of our cases, the preceding sore throat had left the patient very much prostrated. In the second case the weakness following an attack of influenza together with the additional depression incident to prolonged watching over the husband placed the wife in a susceptible condition. In the second case the husband had contracted the disease away from home, from which he had been absent for several months, and the pneumonia was well developed when he returned. Thus a common source of infection for him and his wife is less likely to have existed. The cases which we have personally observed are briefly as follows:

---

[*] Vehr. d. 3. Congr. f. inn. Med., 1884, *Zeitschr. f. klin. Med.*, Bd. 10, 1886, f. 401; Bd. 11, 1886, f. 437.

[†] *Wisner med. Jahrbucher*, 1886.

[‡] Sternberg, Claxton, Fraenkel, Walf, Netter, Vignal. References are to be found in "Manual of Bacteriology," Geo. M. Sternberg, 1892.

CASE I.—A man of about fifty years of age suffered from a typical pneumonia of one lower lobe with profuse expectoration. No measures were taken to disinfect the sputum or prevent its becoming dried. During the first part of his sickness a son of seventeen years of age had a sore throat and on the sixth day of his father's illness was attacked with a croupous pneumonia, involving the right lower lobe, which terminated by lysis, and was followed by an empyema of the same side.

CASE II.—Pneumonia occurred in a man of fifty-eight years, involving the entire right lung and terminating fatally on the seventh day. He had been absent from home for several months, and the symptoms of the pneumonia were well developed at the time he returned. During his sickness the expectoration was very profuse and tenacious, and when he became too weak to expectorate, the wife, who nursed him, used her fingers and cloths to remove the sputum from his mouth and pharynx. On the day of his death his wife exhibited the initial symptoms of a pneumonia, and passed through a severe course of the disease, the right lower lobe being first involved and later the right upper lobe. The case terminated in recovery. Just before the return of the husband, his wife had quite a severe cold.—*The Corpuscle.*

TUBERCULIN AN INFALLIBLE TEST FOR TUBERCULOSIS IN CATTLE.

By LOUIS OLRY LUSSON, V.M.D.,
ARDMORE, PA.

A JERSEY cow, belonging to one of my clients, some six years ago developed a persistent cough that would not respond to treatment. She was then carrying her second calf. I became alarmed at this condition of the mother and told the owner my suspicions, but, as she was milking, delayed the execution for four years, at which time she was tested with tuberculin, and gave a reaction of 2⅜° F. The daughter about this time also developed a cough similar to the mother. She was also tested at the same time (about two years ago), but only reacted about ⅜° F., her normal temperature being about 102° F. My client decided to kill the mother, but *not* the daughter. The autopsy revealed: Right lung entirely hepatized; a mass of cheesy degeneration with cavities here and there containing pus; air entirely occluded. Left lung: anterior lobe, one large cavity containing about one quart of pus; medium lobe, tubercles and small abscess; entirely hepatized; posterior lobe containing some tubercles in the first stages; the pleura and entire thoracic cavity literally covered with tubercles, with some on the omentum. If I remember correctly, the liver contained two or three large tubercles. As will be seen from the result of the autopsy, the animal was doing all her oxygenating through the posterior lobe of left lung, but was in fair condition, and milking some six or eight quarts daily.

From the result of the autopsy above noted, and the fact that the daughter had been for six years the constant companion of the mother, continually breathing the same atmosphere, I concluded that she also must be tuberculous; but the owner, a physician of prominence, stood loyally by tuberculin, and refused to have her killed. About the middle of February of this year I was again requested to test her, and before and after injection the temperature registered 102° F. Fifteen hours after the introduction of tuberculin the temperature had dropped to 101° F., and at twenty-one hours had returned to 102° F. Ten days later I made another injection of a new invoice of tuberculin, and this time the temperature was the same (102° F.) as before; six hours later it had dropped ⅜° F., and continued to fall until at the twentieth hour it registered 2° below that taken before injection. At the twenty-sixth hour temperature had returned to 101⅞° F.

A few days later I destroyed the suspect. Autopsy did not reveal the slightest sign of tuberculosis in any of the organs, but the large and small bronchi in both lungs contained finely masticated food — in some cases packed in the bronchi very tightly, dry and hard, occluding the air; in others, and more particularly in the larger tubes, the material was looser and mixed with pus. There was every evidence of chronic bronchitis, the bronchi being apparently irritated by this foreign substance.

From the facts noted, I conclude that tuberculin has an antipyretic action in cases where there is febrile condition in the absence of tuberculosis, and, further, a sedative action upon irritated lungs, as this subject was always easier for several days after the injection; and, still further, that the introduction of tuberculin into the bovine species is perfectly harmless to a heifer *in utero*, even though the subject is carried by a tuberculous mother; and, finally, that tuberculin is an infallible test for tuberculosis in cattle.— *Univ. Med. Mag.*

INFLUENZA.

The sequels of this disorder have only been studied with care in the course of the epidemics which have prevailed in the last seven years. They escaped the attention of the older observers. They are very numerous. It may be fairly affirmed that many of the gravest characters of the malady occur after the acute stage has passed away, and when convalescence is apparently assured. I think there has possibly been exaggeration in respect of some of the alleged sequels of influenza; still they are, as I have said, numerous. The general asthenic type of the disease is well recognized. The enfeebled mental and bodily states left behind it have been forcibly and sadly brought home to most of us late, both in our own persons and in our patients and friends. Recognizing the fact that each epidemic is signalized by a dominant form for the most part, we may discuss the particular sequels attending, first, the thoracic; secondly, the gastro-intestinal; and thirdly, the nervous varieties of influenza. The personal factor comes in here strongly in respect of each individual affected, and as has been said, "each patient convalesces according to his temperament," and, no less, I would say, his diathesis. Nearly sixty years ago Sir Henry Holland noted the long persisting influence of this disease upon the constitution as a remarkable feature; also the variation of parts affected in different individuals, or at different periods in its progress. In respect of sequels ensuing on the thoracic forms, we may note the prolonged course of the peculiar broncho-pneumonia, so often fatal to the weakly and the aged in its earlier stage. Next the onset of tuberculosis. Abscess of the lung has been several times met with supervening on pneumonia, and Pfeiffer's bacillus has been found in the yellowish-brown sputa expectorated from it, together with elastic fibres from the lung.

Pleurisy is common and empyema may result. The heart is often severely infected. Great weakness of the organ is common; arrhythmia, bradycardia, tachycardia, and pseudoanginal attacks may occur long after the illness. Vertigo is a very frequent symptom, a tendency to it persisting for some months after the attack. The gastro-intestinal variety of influenza may subsequently lead to vomiting, simple catarrhal jaundice, chronic gastro-intestinal catarrh, diarrhœa, or constipation, with marked nervous depression. The nervous variety is apt to lead up to many subsequent troubles. A rapid denutrition of nerve-centres is more or less common in all cases presenting any severity in the early stages. Neurasthenia may prevail for one or two years subsequently. Polyneuritis is a common sequel. The arms may be paralyzed with both motory and sensory disturbance, and wrist-drop may occur; moreover, the same process may occur over large areas. Neuritis may involve cranial and other nerves locally. Encephalitis, myelitis, sclerosis of various tracts of the spinal cord, neuralgia, especially the intercostal variety, conjunctivitis, iritis, otitis media, mastoid abscess, malignant endocarditis, parotitis, orchitis, and lymphadenoma, with other affections, have been noted among sequels in various recent epidemics in parts of the world. Somnolence, or extraordinary drowsiness with hebetude, is a noteworthy feature. Headache, vomiting, and various mental disorders may occur. Melancholia leading to suicide is by no means uncommon. Mental incapacity long remains, and many patients affected in middle life tell of inability for efforts, mental and bodily, that were easy to them previously. They feel many years older in all respects. The natural level of health may never be regained, or not fully re-established for two or three years after a severe attack. Abscess of the brain has been several times noted as a sequel, also simple lepto-meningitis. Mental affections may also sometimes subside after an attack. The sequels of this disease are doubtless often very varied, and often extraordinary. A medical friend of mine has been unable to take coffee since he suffered from a severe attack in February, 1895, without feeling considerable cardiac discomfort, although there was no arrhythmia, and the heart sounds remained normal. In his case, too, and in another there remained for months subsequently a liability to paroxysms of low temperature, with extreme chilliness and distressing sensations; observations made in the mouth, axillæ, and rectum recording a temperature of only 96°. Such attacks continue to occur once in every eight or ten days, and not infrequently in the night. (Nothing afforded so much relief as an ounce of whiskey taken as hot toddy.)

Influenza, in common with other infectious diseases, distinctly appears to predispose to the onset of other diseases. The lowered vitality induced by the primary malady leaves the patient a more ready prey to the attack of any other he may be exposed to. Or a distant interval may elapse between the one disorder and the other. Translated into the language of to-day, we may substitute for the term "lowered vitality" a condition of the solids and fluids of the body in respect of their powers of resistance to invasion by specific toxins which is unequal to the struggle between them and the infection. It is also conceived by Broadbent and others that germs of disease may lie latent in the body and remain inoperative till the resistance of the host is impaired by some circumstance such as infectious or other illness, or traumatism, which forthwith liberates the latent germ with the consecutive onset of a fresh ailment. The occurrence, so frequently, of tuberculosis after injuries and infectious fevers, may possibly be explained in this way, also the development of tertiary syphilitic disorders.

Relapses of influenza are commonly met with, and may occur several times at fairly long intervals after the primary infection and long after the original epidemic has passed away. We may doubt the occurrence of fresh infection from without, as by sporadic influence, in many such instances, and I think we may consider as probable a view of this matter, for which I am indebted to our Registrar, Dr. Edward Liveing. He conceives it to be not unlikely that the toxins of influenza may act very much as does that of malaria, leaving behind it residues of specific infective matter, which wake up into activity from time to time, and induce fresh outbursts of the disease in response to any conditions which temporarily lower the general vitality of the body. We may thus regard such relapses as evidences of sequels of the direct residual class. I have experience of cases in which four or five attacks have occurred within two or three years, and at varying intervals. The conditions in respect of symptoms, type of pyrexia, and general character leave no doubt as to the true nature of the disorder, and intelligent patients, in three cases in the persons of well-known members of our profession, have recognized only too well the specific qualities of it.

Acute bronchocele has been several times observed to follow influenza. One lobe may become enlarged and give rise to dyspnœa, or orthopnœa with a fluctuating tumor. Incisions give exit to viscid fluid, with relief to the symptoms, but the discharge may continue to flow for months. One of the most remarkable cases I have seen occurred in a gentleman, aged 68, in whom great wasting had occurred in the pectoral muscles. This followed an attack of influenza nine months previously. Twenty-eight pounds weight had been lost during that time. The ribs were plainly visible. There was marked difficulty of inspiration, and the upper portion of the chest hardly moved. There was no myxœdema. The brachial muscles were soft, but those of the lower limbs were firm. There was general weakness and early fatigue on walking. Improvement slowly followed treatment by massage, warm douching, and dosage with strychnine, phosphorus, and arsenic. This man was at one time apparently in peril from respiratory difficulties. There was evidently some focal myelitis in the cervical portion of the cord. Recovery ensued after treatment. Bladder troubles may set in and persist after an attack. Diabetes has been several times observed as a sequel. Arthritis and multiple synovitis sometimes follow influenza. At the outset of many cases it is sometimes difficult to be sure that rheumatic fever is not in progress. There may be pains in joints and pyrexia. The two disorders may even occur together and lead to a very grave condition, owing to carditis. Cases have been carefully observed in which symptoms of myelitis, involving several tracts in the cord as well as the cornua, have led to arthritis or true spinal arthropathy.—*Brit. Med. Jour.*

◆

ANTI-TYPHOID SERUM.

In the course of a communication to the Paris Société de Biologie on February 22, on the "Early Diagnosis of Typhoid Fever by a Bacteriological Examination of the Stools," M. Chantemesse said that last June he had succeeded in immunizing several horses against the virus of typhoid fever. He had obtained the serum of such strength that one-fifth of a drop inoculated into a guinea-pig twenty-four hours before infection protected it against a dose of typhoid virus fatal to animals not previously injected with the protective serum. It was ascertained, also, that injections of the serum produced no injurious effects upon a healthy man. M. Chantemesse stated that he had since employed injections of serum in three cases of typhoid fever. The temperature showed a regular fall from the time the first injection was made, and seven days after the commencement of the injections all three patients were quite free from fever, and had commenced to convalesce. M. Chantemesse added that the cases were not yet sufficiently numerous to permit any trustworthy conclusion to be drawn.—*Brit. Med. Jour.*

◆

ANTHROPOLOGY AS A BRANCH OF MEDICAL EDUCATION.

Anthropology, as comprehensively defined by Broca, is the science of man. Taken in its widest sense, it comprises not only anatomy, physiology, pathology, psychology, and the other studies usually included at the present day in the medical curriculum, but also archæology, ethnology, biology, and allied subordinate sciences that investigate man as an individual and in the aggregate, both specifically and in his relations to surrounding natural objects.

The study of man cannot be separated from zoölogy, the science of all animal life, or of biology, which studies the functions of living beings, without giving rise to narrow, one-sided, and erroneous views. The study of the manifestations of intelligence in the lower animals, and the results attained by comparative anatomy and therapeutics, have thrown much light upon some of the most difficult problems in human pathology and clinical medicine. Pharmacology, indeed, may be said to lay its claims to recognition as a science principally upon physiologic investigations on the lower animals and upon practical deductions from results in the field of comparative medicine.

In a restricted and metaphysical sense anthropology has been applied to the study of man in his relations to the Deity; but in the present consideration the term will be used only in its accepted scientific meaning, in accordance with the definition given above. Anthropology, in the first place, assigns man to his proper position in the scale of living beings, where he stands "the paragon of animals." It is true that structurally he cannot be considered the peer of some of the inferior animals. He has not the physical strength of the gorilla, the rapid pace of the greyhound, the swimming power of the seal, the flying power of the bird or bat. His special senses are less keen, there are many animals which have superior acuteness of hearing, of sight, or of tactile sense. His vitality, the ability to resist disease, to endure fatigue and hardship, is manifestly inferior to animals generally, speaking of them as they exist in their natural state. It is solely the extraordinary and excessive development of the cerebral hemispheres, especially in the anterior lobes, that places man in his elevated position in the scale of creation and separates him widely even from the most highly developed ape. There is also a manifest difference in the quality of the gray matter, as well as in the quantity, which of itself separates man from the anthropoid simians as from all other inferior animals, and to which due consideration should be given in discussing man's affinities and specific traits, and his claims to classification apart from inferior animals.

The question whether there was originally only one race of man or whether there were distinct types of mankind from the beginning, can be discussed more temperately at the present time than it could be at the period when Nott and Gliddon wrote on "The Types of Mankind" Human slavery and the social problems arising from it no longer invade our halls of science and disturb the philosophic calmness of debate. At present the weight of authority seems to be in favor of the theory of unity of origin. This is really in accord with the statement made by Darwin himself, who says: "When naturalists observe a close agreement in numerous small habits, tastes, and dispositions between two or more domestic races, or between nearly allied natural forms, they use the fact as an argument that all are descended from a common progenitor, who was thus endowed; and consequently, that all should be classed under the same species. The same argument may be applied with much force to the races of man." This argument from analogy has considerable weight, and, at all events, encounters less opposition than it did a generation ago under different economic conditions.

Some three years ago Prof. Daniel G. Brinton, of Philadelphia, wrote a pamphlet on "Anthropology as a Science and as a Branch of the University Education," in which he made a strong appeal for the recognition of the claims of this science as a branch of instruction in our colleges. It would seem as if his arguments could be applied to our great medical schools with even more force than to the secular institutions. It would be a great gain to medical education if anthropology should be commenced in the preparatory course and concluded in a post-graduate course, after having been followed for the whole period of undergraduate study. In this way a systematic, comprehensive, and consistent course could be followed, which could be continued to any desired extent by those who felt themselves especially attracted to this science.

The first school of anthropology, according to Dr. Brinton, was founded by Broca, at Paris, in the year 1876. This institution, beginning with five professors, now has ten, the demand for more extended instruction having steadily increased from its inception. It has very close relations to the medical course, and the majority of its students are also students of medicine. A second school is now in operation in the same city, in connection with the Museum of Natural History at the Jardin des Plantes. A school has recently opened in Italy known as the Faculty of Anthropology in the University of Rome, under the special charge of Professor Sergi. There are departments of anthropology in the Universities of Munich, Berlin, Marburg, and Buda-Pesth, and instruction is likewise given in this branch at Leipzig and a number of the other chief educational institutions of Europe. The University of Brussels has established a full chair of anthropology, and a similar position exists in the Musée Polytechnique at Moscow. In the United States regular courses on physical anthropology and ethnology have been given by Dr. Brinton, at the Academy of Natural Sciences in Philadelphia, since 1886. The University of Chicago and Clark University at Worcester, Mass., had also given instruction upon this subject, and Harvard University for many years has taught ethnology and allied branches, but up to 1892 no full professorship of anthropology has been established by any educational institution in this country. Since Dr. Brinton wrote, the University of Chicago has established a titular chair, and will shortly commence systematic instruction in this department. Last year the University of Pennsylvania appointed Dr. Brinton to a newly created position in the faculty, Professor of American Archæology and Linguistics, in recognition of his services to this particular branch of science.

The method submitted by Dr. Brinton, as the best one to be pursued by teachers of anthropology, is the subdivision of the study into four associated departments of nearly equal importance:

Somatology. — This studies the physical nature of man, his anatomy, physiology, and biology, so far as these bear on the distinctness of races, peoples, and nations. Psychology, so far as it is an experimental and inductive science, belongs to this department.

Ethnology.—This is in its methods historic and analytic. It contemplates man as a social creature. It is more concerned with the mental, the psychic part of man than with his physical nature, and seeks to trace the intellectual development of communities by studying the growth of government, laws, arts, languages, religions, and society.

Ethnography. — This is geographic and descriptive in its plans of research. It studies the subdivisions and migrations of races, local traits, peculiarities, and customs; and confines itself to matters of present observation.

Archæology.—This comes in to supply the material which neither history nor present observation can furnish. It pries into the obscurity of the remotest times and periods of man's life on earth and gathers thousands of facts, forgotten by historians and overlooked by contemporaries. Often these unconsidered trifles prove to be of peculiar value and furnish the key to the real life of ancient nations.

Necessary adjuncts to the systematic study of anthropology are properly equipped laboratories for practical observation and original investigation. Library labor, consisting in courses of reading in the literature of the science, should also form a part of the assigned tasks of the student in this department.

Such a course of study as here outlined would prove especially attractive to those physicians, who take a broad and comprehensive view of the problems of disease from the biologic standpoint.—*The Journal.*

SOME NOTES ON THE ARTIFICIAL FEEDING OF INFANTS.*

By Dillon Brown, M.D.

The basis of every artificial food for healthy infants must be milk, and for all practical purposes this means, from necessity, cow's milk.

Therefore the "milk question" becomes of primary importance in the artificial feeding of babies. For cow's milk to be wholesome, it must come from a healthy and properly fed cow; its nutritive qualities should not be diminished by adulteration, whether with harmless substances or not; and it should be free from contamination by decomposing animal matter or by bacteria. This makes it almost as important a subject as the question of water-supply, and certainly a more difficult and complicated one to solve. When we refer to cow's milk in the following notes we mean only wholesome cow's milk, which is fresh, free from adulterants and bacteria, and is obtained from healthy cows, which are properly fed on hay or grass, kept in clean stables, and given clean and fresh bedding. At milking every precaution is taken to prevent contamination of the milk by dirty hands, udders, and vessels.

---

* **Read before the Hospital Graduates' Club.**

Of course, artificial feeding should be discouraged if good human milk in sufficient quantity can be obtained. When cow's milk is used, it must be modified to resemble as closely as possible human milk. Cow's milk contains somewhat less fat than woman's milk, but the former contains 3.76 per cent. of albuminoids, while the latter only contains 1.94 per cent., or about one-half, and of the albuminoids, the casein in cow's milk is five times, while the albumin is only one-half, as great as in human milk. If we remember that cow's milk contains more proteids and less fat and sugar, that it is distinctly acid, while the other is slightly alkaline, we have a basis upon which to prepare the food.

The general principle underlying all methods of artificial infant-feeding is to modify cow's milk so that it will resemble as closely as possible human milk . and this is done by diluting with water to reduce the percentage of albuminoids to the proper amount. and adding enough cream and sugar of milk to raise their percentage to that in normal human milk, not forgetting to compensate for the loss brought about by the first dilution with water.

The average milk for a baby will contain 4 per cent. of fat, 7 per cent. of sugar, and 1 to 2 per cent. of proteids, which proportion can be approximately obtained by mixing cream, milk, sugar of milk, and water in proper quantities, and adding enough bicarbonate of soda or saccharated solution of lime to make the mixture slightly alkaline.

Good centrifugal cream contains about 20 per cent. of fat, but even where people have their own cow the cream is liable to be exposed to contamination by being kept too long. Therefore, it is wiser to use a cream obtained by either Meigs's or Rotch's method, although it is weaker in fat. Meigs thus directs: "One quart of good ordinary milk is placed in a high pitcher or other vessel, and allowed to stand in a cool place for three hours; then one pint is slowly poured off from this, care being taken that the vessel is not agitated, the object being to obtain the upper layer of fluid, rich in fat, and leave the lower, comparatively poor, portion behind." This upper half can be drawn off much more easily by having a stop-cock in the side of the vessel, half-way between the top and bottom.

Meigs makes his food by adding three tablespoonfuls of this weak cream to the same quantity of sugar-water, made by dissolving 18 dr. of sugar of milk in one pint of water; and to this is added two tablespoonfuls of lime-water If a larger quantity is needed, the same proportions are kept.

However, it seems to me that Rotch's plan is better, as it is simpler and allows more accuracy and variety in modification. He lets a quart of good milk stand in ice-water for six hours, and siphons off from the bottom 24 oz. of milk, leaving 8 oz. of cream on the top, which will, on the average, contain 10 per cent. of fat.

Now it becomes a comparatively simple matter to modify the food by mixing the various ingredients to get any percentage of fat, proteids, and sugar.

The average milk—namely, 4 per cent. fat, 7 per cent. sugar, 1½ per cent. proteids—will be obtained by mixing 8 oz. cream, 1 oz. lime-water, 11 oz. water, and 8¼ dr. of milk-sugar (no milk); "4–7–2" milk will be obtained by mixing 8 oz. cream, 2½ oz. milk, 1 oz. lime-water, 8½ oz. water, and 7½ oz. milk-sugar, etc. By increasing the cream, the percentage of fat and proteids will be increased in a 20-oz. mixture by about 0.5 per cent. of the former and 0.18¾ per cent. of the latter for each ounce; the percentage of proteids will be increased 0.18¾ per cent. for each ounce of the skimmed milk, etc.

Even more accurate than the home modification of the food is the process of the Walker-Gordon Laboratory, and this undoubtedly marks an era in the use of infant-foods. The objections to it are those which apply to all patented processes, and its expense. My own experience has been that the best results are obtained by the home modification of a cow's milk which is wholesome and properly handled; and when such a milk can be obtained, the infant thrives on a raw milk much better than on a pasteurized or sterilized one. And again, I usually remove as much of the casein of the milk as possible with rennet or dilute hydrochloric acid, and substitute in its place the albumin from an egg. This gives better results, as we would expect when we remember that the proteids of cow's milk, as compared to human milk, is for casein as 3.01 is to 0.63, while for albumin it is as 0.75 is to 1.31. In other words, cow's milk contains five times as much casein and only one-half as much albumin as human milk.

There is no doubt that some children with weak digestion require certain additions to the foregoing combinations; and the question of adding cereals, Liebig foods, milk foods, meat juice, or of sterilizing, pasteurizing, or peptonizing the food presents problems that would require more time to discuss than can be devoted to it in this short paper.

The Liebig foods are often of value in children with poor digestive powers; but it must be remembered that they never can and do not claim to be a substitute for milk, but are only to be used as a valuable addition in certain cases to properly handled and properly modified cow's milk—*Am. Med.-Surg. Bull.*

GENERAL TREATMENT OF ANÆMIAS.

There is no disease in which therapeutics may become more perfunctory or routine than in the different forms of anæmia. All varieties except pernicious anæmias are apt to improve under iron, in whatever form it is given, and the variation in the methods of treatment in common use is chiefly between the different preparations of iron, especially between the organic and inorganic. Many obstinate cases would probably yield much sooner if a clearer understanding of the causes of anæmia were attained.

Three conditions are present in the majority of anæmias: First, gastro-intestinal disturbance, with imperfect digestion, assimilation, and excretion of food, producing some form of ptomaine-poisoning or intoxication, which causes marked changes in the blood; second, failure in the action of the liver, which is the most important agent in checking the activity of the poisonous elements absorbed from the intestinal canal, and in preventing these elements from entering the general circulation; third, the uric-acid diathesis, which is closely associated with most marked gastro-intestinal troubles, and produces more or less decided blood alterations. These three agents are intimately connected with nearly all cases of anæmia, and due attention should in every case be shown to their influence upon the symptoms.

If any of the occasional causes of anæmia be present, such as gastric ulcer, hemorrhages of any kind, or poisoning by malaria, syphilis, tuberculosis, lead, or uræmia, no headway will be made in curing the patient until these are first properly treated by appropriate drugs.

To produce the most satisfactory results in treating anæmia it is necessary to follow closely the mechanism of blood-reproduction after any of the diseases affecting the red blood cells. This takes place largely through the agency of the red bone-marrow. As the only drug which acts directly on the metabolism of bone and marrow is phosphorus, it would seem a very important addition to our means of treating anæmia from any cause.

It should be given in a pill containing phosphorus, or in the palatable elixir phosphori N. F. ($\frac{1}{64}$ grn. in each fl. dram). If hypophosphites are used Ringer says that they should never be combined in the same prescription with cod-liver oil or alcohol.

To hasten the production of new red blood cells, a preparation of bone-marrow has been proved to be valuable, either in the form of raw freshly extracted marrow from the bones of young lambs or calves, spread on bread or in the more permanent form of a glycerin extract. W. G. Thompson, however, regards marrow as merely an assimilable form of fat, and rather doubts the specific action on human bone-marrow and red blood cells. There is only about $\frac{1}{56}$ grn. of iron to an ounce of marrow, so that its favorable action is not due to the iron contained in it; but such excellent results have been obtained by it that, whether regarded as a food or a drug, it should be faithfully used.

In the diet, milk should be given in large amounts, frequently repeated during the day, for the amount of fluid in the circulation is frequently far too small, and the capacity of the heart and vessels correspondingly reduced.

If milk is not well borne, a mixture of cream and hot water, with a little bicarbonate of soda and brandy in each glass, is the best substitute. Free use of cream and butter may take the place of cod-liver oil in supplying the fat which is needed in most cases.

The extent to which carbohydrates are to be used in the diet depends upon whether the patient is too lean or too fat.

Albumin in all cases must be increased. Rare meat two or three times a day is advisable ($2\frac{2}{3}$ oz. per diem according to Van Noorden). A careful variation in diet to suit the condition of the digestive organs and general nutrition is advisable.

There is no disease in which general massage is followed by such satisfactory results as in anæmia. Massage should be applied to the muscles of the trunk and extremities, but more especially to the abdomen, giving particular attention to this part of the body to increase the physiological activity of the gastro-intestinal tract, the spleen, and the liver. Massage properly administered will frequently cure cases of chlorosis without the use of any drugs.

Those forms of hydro-therapeutics in which bathing is followed by a prompt reaction and general stimulation of the entire system are valuable, but constant daily cold sponging or bathing must be used with great caution, less they gradually lower the tone of the system by minute degrees. Not only cold bathing but cold weather also will do this. Murri and Rosenbach have made a careful study of certain types of anæmia limited to cold weather and disappearing in the summer. Either a warmer climate or some treatment that will fortify the system against cold is necessary in such cases.

Rest in bed will serve to cure many forms of anæmia without the use of drugs, and should always be insisted upon as far as possible; even the milder cases will be helped by resting in the mornings and evenings. If these general hygienic and dietetic methods, with the careful use of iron in any form that can easily be tolerated by the patient, assisted by measures affecting the gastro-intestinal system, liver, and bone-marrow, fail to affect the anæmia, the substitution of arsenic with strychnine will frequently be followed by a cure.

In many cases arsenic acts directly by its anti-malarial influence, especially in those forms of anæmia accompanying old malarial cachexias, where quinine has little effect. H. C. Wood states that the drug acts on many forms of anæmia in an indirect manner, by removing the morbific agent of the disease and allowing the recuperative powers of the system to assert themselves. In other cases its action is due to the usual effect of arsenic upon general nutrition. Even in pernicious anæmia there is frequently observed a temporary improvement of the patient, which is coincident with an increased output of red blood-corpuscles. In many cases this temporary gain may be made permanent by following the arsenic with another course of iron, with the idea that the arsenic has removed the cause that previously made the iron ineffective. But the attempt to cure anæmia of any kind by the use of iron alone, without any of the forms of treatment, hygienic or dietetic, is unscientific.—*Am. Med.-Surg. Bull.*

Department of Physical Education.

WITH SPECIAL REGARD TO THE SYMMETRICAL DEVELOPMENT OF THE BODY.

Edited by J. Clark Slay, M.D.

(*NEW YORK.*)

"EXERCISE AS A REMEDY."

It is pleasing to observe the great and growing interest that is now being taken by physicians in exercise, not only as a means of symmetrical development of the body to insure health, but also as a remedy in certain forms of disease. In the March number of the *Popular Science Monthly* Dr. Henry Ling Taylor has a paper with the above title.

"Exercise," says Dr. Taylor, "is not a remedy which in some mysterious way may prove beneficial in disordered conditions of the system, still less a specific in any given disease, but it may be made the means of producing general or powerful effects of a definite kind, which vary with its form, intensity, duration, time of application, method of administration, and the condition of the patient. The problem presented to the physician in a given case is not merely the prescription of exercise, but rather such proportioning and contrasting of the muscular activity to periods of rest that the total result shall be beneficial; here, as always, the patient is to be treated rather than the disease. Exercise employed systematically and with discrimination is of the highest value in the prevention of debility and disease, and also in the treatment of certain chronic affections. In many acute and some chronic diseases exercise is positively and actively injurious, and it is always liable to prove so when employed without due regard to its physiological effects. Though most of the useful effects of exercise can be obtained under skilled supervision with little or no apparatus, its practical importance is ignored in hospitals, but little recognized in asylums, and imperfectly appreciated in private practice. The neglect of exercise as a therapeutic resource is traceable to failure to appreciate the indications for its employment, and perhaps still more to lack of precision in its application. While its proper prescription is undoubtedly more difficult than that of drugs, no drug is capable of producing effects at all comparable, and the care and attention devoted to its intelligent application by physician and patient are well repaid. It is a practical point of the first importance that individuals differ enormously—according to constitution, temperament, training, and previous habits—as to the amount of exercise that will be required to produce a given result. . . . Like some drugs, exercise may produce different and even opposite effects, according to the dosage and consequent intensity of action. Slow, rhythmical, passive movements are decidedly calming, while moderately active movements are stimulating to mental activity. A careful distinction should be made between primary and remote effects. Exercise has also its synergists, antagonists, and incompatibles, its acute and chronic toxic effects, and their antidotes. The synergists of exercise are fresh air, a nourishing diet, sufficient rest, an unstrained and cheerful mind, and temperate and regular habits; moderate cold and possibly certain tonic drugs are a help to exercise. Exercise is antagonized by the opposite of the above-mentioned and by toxic substances in the blood. . . . It has been pointed out that the individual patient usually needs not exercise or rest exclusively, but exercise and rest in the proper proportions and in the proper order. The beneficial effects of treatment may often be enhanced by placing the two in sharp contrast. Exercise produces a better impression on a background of rest, and rest on a background of exercise; and particular attention should be paid to securing variety of action by contrasting one set of exercises with others involving different groups of muscles, or the same groups in a different order. The level road may be the harder to travel in the long run. Neither its specific effect in any named disease, still less the piling up of enormous masses of muscle, is the therapeutic object of exercise, but the production of definite local or general physiological effects. Increased muscular power is usually an incidental result, but marked remedial effects are often produced by very moderate muscular development. The too dominant idea of 'gymnastics' should not make us lose sight of the vast therapeutic importance of the nervous reactions associated with muscular movements, and of the systematic culture and training of the involuntary neuromuscular apparatus which certainly depends in a large degree on the activity of skeletal muscles."

THE PROPER RECOGNITION OF PHYSICAL TRAINING IN THE GENERAL SCHEME OF EDUCATION.

IN a way physical training is becoming recognized in our educational institutions, but not in the best way. It is generally spoken of as a good thing in its place; but its place is put outside of the general education scheme. It belongs among recreations. It is a proper recreation, and the Puritanism that regarded all recreation as improper is waning. It is felt that an advanced and pretentious institution of learning that lacks a "gymnasium" is a little behind the age. The "gymnasium" may be regarded as only a fad, still if a school is to be quite up to date it ought to have something that can be dignified by this title. Even the common primary schools, in the more progressive parts of the country, are not considered quite complete without a "play-ground" and, perhaps, a set of parallel bars and a few swinging rings set up in one corner.

Then, too, physical training is recognized as a necessary part of "athletics." The essential thing in "athletics" is a "team" that can win victories over the teams of rival institutions, securing enough gate-money by the exhibition of its prowess to largely sustain itself, and contributing to the further advantage of its promoters a large amount of valuable advertising. This is the essential thing in "athletics." But it is recognized that to attain it the team must receive the best of physical training, a certain number of substitutes must be similarly prepared, and a certain amount of training of a larger proportion of students must be done preparatory to the selection of candidates for the honors of the "team."

The result is that those students in high schools and colleges who have attained the best physical development in lower schools, and are least in need of physical exercise, and most certain, by reason of native inclination and previous habits, to take all that is necessary—these students are brought together, placed under special regimen, furnished with the best obtainable instructors, relieved from duties in other directions, and in every way encouraged to attain an abnormal muscular development. For the other nine-tenths of the students there is offered an opportunity, strictly limited by requirements in other directions, for a minimum of physical development, by way of "recreation," or the perfunctory observation of certain hours and exercises.

The medical profession, confronted every day by the wrecks of undeveloped bodies, and distorted, unbalanced, and diseased nervous systems, is in position to recognize the utter failure of the present system, or lack of system, of physical development. The remedy for this state or things is, we believe, a recognition of physical development as an essential object in education. It should be placed in the curriculum as of equal importance with any class of studies now so recognized. Indeed, more properly it should take precedence of all others. This view was recently supported by Dr. D. A. Sargent in a paper on "The Harvard Summer School of Physical Training," read before the Boston Society for Medical Improvement. Speaking of the improvement of physical training for the mass of students who are not college athletes, he says:

"I maintain that the only rational method that will enable us to accomplish this desirable object is by placing mental and physical exercises on the same plane, and by rewarding every honest and faithful attempt towards physical improvement by the same recognition that we bestow upon the efforts to improve the mind."

That is, he suggests that graduation and class standing should depend as much upon so-called physical development as upon proficiency in any of those branches which now determine them; that the degree, which is supposed to stand for general culture, should represent soundness, health, and a command of one's powers in all directions, rather than simple familiarity with certain limited fields of human learning.

Of course, such a radical change will be opposed. Some will ask, "Would you take away all the spontaneity of physical recreation, substituting for it set tasks and repressive regulations?" Quite the opposite: we would leave the same opportunity for outdoor games as now, and give by such a plan the greatest encouragement for those to devote time to them who now most need them. The ambitious student of to-day, with attention fixed on class standing or prize competition, feels every minute devoted to physical exercise of any kind as wasted.

The young person who has never encountered his or her limits of physical endurance and learned wisdom by the encounter, never appreciates the importance of physical development during youth. Even required physical exercises will be performed in a spiritless, perfunctory manner by him who does not see that it aids him towards ends in which he is really interested. The grading upon the thoroughness with which such exercises were performed and the improvement of physique attained by their performance would reverse all this, and the ambitious student would find far more healthy channels for his ambition than the memorizing of word-roots and mathematical formulas.

We have referred most directly to the place of physical training in colleges and higher schools; but its more important benefits are only to be reached by careful attention to it in the earlier years of childhood; so that its recognition in the curriculum is important from the very beginning of the graded school course.—*E. J. in Phila. Polyclinic.*

VITALITY.

The question of a vital force is an old one that up to within a few years back was considered by the average follower of the physiologic leaders as one that was unworthy of serious scientific discussion. It was largely the fashion to treat all vital phenomena as manifestations of what must be some form of chemic or physical action, mainly, it would appear, on the assumption that it could not possibly be anything else. It was often confidently claimed that physics and chemistry would yet reveal all the secrets of vitality, and that to acknowledge anything special and mysterious, such as an unknown and possibly unknowable vital force or principle, was unscientific and reactionary. Within the last ten or twelve years, however, there has been a rather marked change in the general trend of views on this subject, as has been pointed out by Dr. McKendrick, and vital processes are recognized as supplementing chemic ones. This movement is at present led by some of the ablest of physiologists and physicists, and Ludwig and Helmholtz, who with others were largely responsible for the common rejection of the "vitalismus" doctrine, lived themselves long enough to see the reaction from the tendencies of which they were, in a sense at least, to some degree the originators.

At the present time biologists are actively speculating upon the properties of matter which are due to what we call vitality. They recognize this last as a fact, but can only offer theories to explain some of its workings; its peculiar essence is beyond their comprehension and may always remain so. Why matter at one moment should possess a certain something which we call life, which endues it with properties and capacities that are clearly above and to some extent subversive of chemic and physical laws, and then at another moment, without manifest change in composition, be deprived of these endowments, is and possibly always will be a mystery.

The assumption, however, of a special vital "force" is uncalled for, unless we are to understand by the term force something differing from everything else to which the word is applied. Vitality is not convertible itself into motion or correlated with any of the physical forces, mechanic, chemic, thermic, or electric, but overrides and controls them in what we know as living as distinguished from dead matter; no chemic or physical laws can account for the processes in the simplest living cells, much less the possibilities of heredity in the spermatozoön or the ovum. We can perhaps speak, as does Minot in the latest issue of the *North American Review*, of a "special vital power which is not necessarily identical with any form of physical energy, though it may be conceived to cause the transformation of energy," but that is an entirely different thing from calling it a force in the legitimate signification of the term. It would be better to adopt the name "vital principle," which was a favorite term of the late Prof. Joseph Henry, one of the most prominent physicists of his time, thoroughly competent to give the limitations of the term force as properly understood, and also a believer in the reality of the distinction of vital from physical and chemic processes. The term certainly better expresses the relations as they exist and leaves us sufficiently uncommitted and free to accept any future, more positive knowledge that can be gained. It is at all events safer and less presumptuous to admit that there is a vast field that remains beyond our ken and power of comprehension in the commonest physiologic processes, than it is to attempt to extend the known laws of matter into and over the unknown and possibly the unknowable. And with the apparent present tendencies of physiologic thought, it would seem possible that those who still make such assumptions will be soon considered as decidedly behind the times.—*The Journal.*

TWO BICYCLE DANGERS.

ANYTHING further about the bicycle may seem superfluous. Its hygienic advantages and dangers have been so largely considered the world over that little remains for the present to be said. But with the beginning of a new season it may not be amiss to call attention to two dangers attendant upon the use of the wheel.

Of these, one applies to men chiefly, and consists in the possibility of improperly adjusted saddles, causing an irritation of the perineum. The occasional occurrence ot such irritation is unquestionable, and its results concern the posterior urethra rather that the prostate. Although much is said in speculation of the future "bicycle prostate," that organ is well protected by surrounding tissues, and lies too deep in the pelvis to be seriously influenced by the pressure and resulting congestion from the saddle. It is yet too early to affirm that the increase in bicycle riders will not be accompanied by an increase in the number of hypertrophied prostates; from anatomical grounds, however, such a danger appears slight. It is more probable that any perineal difficulty resulting from bicycle riding will show itself in and around the membranous urethra. It is needless to add that urethræ which have sheltered the gonococcus in their folds are the most liable to become inflamed and the seats of abscesses. Badly fitting saddles have already caused many cases of periurethral abscesses. To avert the extreme pressure on the perineum, and to throw most of the weight on the tubera ischiorum, several "anatomical saddles" have been invented. The principle is the same in all; and although these saddles are less comfortable than the old-fashioned ones, their hygienic superiority is unquestionable. Much the same mechanical advantage may be obtained by tilting forward the ordinary saddle, so that its front part is in a considerably lower plane than the posterior part; the body-weight will then bear chiefly on the ischial tuberosities, and the perineum will touch the saddle but little.

The second danger applies equally to men and women, and has reference to overaction and possible hypertrophy of the heart. If any one stops to count his heart-beats, after even only a moderately brisk spin, it will be found that they are decidedly accelerated, and that the cardiac overaction lasts for a considerable length of time. The amount and duration of the tachycardia will vary, naturally, with the individual, and in the same individual at different times. But the heart should have resumed its normal rate at the end of 15 or 20 minutes, and if it does not do so it may be inferred that it has more work to do than it can conveniently handle. Accordingly, the bicycle rider, whether man or woman, will only err on the side of safety by noting how much the heart can with safety stand, and will regulate his speed and distance accordingly.—*Am. Med.-Surg. Bulletin.*

"SUMMER COMPLAINT."

Rather more than fifteen per cent. of all who are born into this world leave it within a year, and more than twenty-five per cent. before they have reached their third anniversary. When we reflect that the passage of thirty-eight years more is necessary to remove another quarter of the human race, we can form some conception of the enormous odds with which the infant has to contend. The figures cited are from standard tables based on observations of both city and country life. Within a few years, returns from Berlin, a number of French and Italian cities, and even Boston, have placed the mortality of infants of one year and less at from twenty to thirty per cent.; nor are these statistics exaggerated by the inclusion of still-births.

It is also beyond controversy that a large proportion of the total infant mortality is due to troubles which may be included in the term "Summer Complaint." We shall not attempt to quote statistics, since such tables vary widely in different cities, and in the same city according to annual variations of climate, to proper or improper sanitary measures, etc. It also lies far beyond the scope of the present consideration to enter into the diathetic and infectious influences, the accidents and injuries that swell the infant mortality. We purpose limiting ourselves to the gastro-intestinal inflammations and irritations which depend largely on improper feeding and sanitation, and which occur with such relative frequency in the warmer months as to warrant the vague term "summer complaint."

In its most typical form, this is a cholera; in other words, an inflammation of the small intestine whose conspicuous symptom is colliquative diarrhœa. Except from the frequency and severity of this disease—or rather group of diseases—in the case of young children, there is nothing to justify the specific use of the term "cholera infantum," since it is nothing but cholera nostrum occurring in infants.

The wise physician suspects the stomach in every case of intestinal catarrh or indigestion. Not that there is necessarily or even frequently an antecedent organic lesion of the stomach, but because the most common and the most tangible source of intestinal disorders is the entrance of a fermenting mass of improperly prepared chyme.

Cholera infantum is due to bacteria, but not to any specific bacterium. Fenton B. Turck, of Chicago, believes that he has demonstrated at least half a dozen kinds that will produce lactic acid fermentation alone. A dozen or more germs are found in the mouth at all times, while the intestine teems with the bacillus coli communis and a number of other varieties. Except that the antiseptic action of hydrochloric acid renders the stomach reasonably sterile during the height of digestion, the entire alimentary canal is a long culture tube from the time when the new-born baby inspires, screams, and swallows, till the organic matter of the body has been destroyed by decay or fire. Hence, the rapid development of saprophytes and other germs, the consequent irritation of the mucous membrane of the small intestine—and very likely of that of the stomach and colon as well—and the poisoning of the entire system through the absorption of ptomaines and leucomaines indicate, not a total change from the normal condition, but merely a heightened degree of bacterial activity.

Bad sanitation and, especially, crowding in imperfectly ventilated and poorly drained apartments have long been recognized as prolific sources of cholera infantum. The disease, therefore, is essentially one of cities and, pre-eminently, of the slums. There must be considered, not so much the absolute population of a city as the density of its population, the absence of breathing spaces in the shape of yards and parks, the existence of a contaminated water-supply, and the lack of efficient control of tenement architecture, of food and milk supplies, and of garbage collections. It is impossible to select any one factor of slum life as a sole or principal predisposing cause to cholera infantum. It may be that the parents, debilitated by poverty, hard work, poor food, or disease, or by all combined, have brought forth children predestined to physical damnation. It may be that the child is weakened, not so much by heredity, but by confinement in the stifling atmosphere of a room that is at once kitchen, parlor, and chamber, or by recent conflict with contagious disease, or that he has directly irritated his stomach by delving in the swill-tub or by drinking the dregs from a beer-glass.

Breast-fed children are, on the whole, less prone to summer complaint than those artificially reared, yet too broad generalizations must be avoided. The state of enlightenment in which we live has developed two classes of women who are physically incapacitated to yield nourishing milk, or even milk sufficient in volume alone. On the one hand is the class in which physical decadence is due to lack of nutrition, proper rest, and hygienic surroundings, on account of degrading poverty. On the other, by a curious illustration of the fact that extremes may meet, we find the daughters of luxury, overfed and underworked till a supersensitive nervous system has usurped the importance of the vegetative organs. Again, we have a large and growing class who, whatever their secretory capabilities may be, are prevented from nursing their offspring by the demands of social engagements, or of business or professional "duties," or merely from the increasing sentimental objection to child-bearing and child-rearing.

While lamenting the existence of these classes of deficient maternity, we protest against the notion that there is any mysterious source of health in mother's milk. Let us admit that art cannot perfectly imitate the combination of the different foods in normal milk, it is still true that a sterile, nutritive, and wholesome mixture may be made upon which the average child will thrive. Many a breast-fed child is killed by its mother through her failure to appreciate, (1) that a nasty breast may lodge as virulent germs as a bottle ; (2) that milk is a food, not a hypnotic ; (3) that a child may cry because it wants water, or is pricked by a pin, or is too warmly dressed, or for various other reasons, and that its emotions are not all centred in the nipple. Many a mother, riddled with tuberculosis or exhausted by overwork or prostrated by some sudden grief, persists in nursing her child in the belief that she is fulfilling the holiest duty of maternity, when, in reality, she is endangering the life of the child, as well as sapping her own vitality. Better any rational substitute for human milk than the natural nutriment poisoned by disease or attenuated by debility.

Whether breast-fed or bottle-fed, it must be remembered that the baby's draughts of milk are meals, and that they must be taken regularly. Ordinary cleanliness must be observed with regard to the child's mouth and the source of nourishment. In the case of bottle-fed children, partial sterilization should be insisted upon. Milk fully sterilized by boiling, however, loses much of its nutritive power. The long tube of the nursing-bottle has slain its thousands and must give way to the simple nipple fitting over the top of the bottle.

Much can be done to diminish infant mortality, if the obstetrician will bear in mind that he has not completed his duty until he has instituted a regimen for the child which shall include cleanliness, proper clothing—neither too warm, too cold, nor too tight—proper exercise and outdoor life, and, most important of all, regular feeding. After some experience with babies who have been subjected to such a regimen, whether at the breast or on the bottle, we feel justified in declaring that cholera infantum is largely a preventable disease.

We feel called upon to offer no apology for having touched only here and there on the subject in hand. A discussion at length and with full attention paid to logical sequence would involve a tedious repetition of facts already well known.—*Med. and Surg. Reporter.*

THE INFLUENCE OF FEAR UPON THE SYSTEM.

It has been a well-established fact for a long time that in cholera and small-pox scares, and the like, fear increases the susceptibility of the individual to the disease; and so it might be said in reference to all diseases—that fear not only increases the liability to contract contagious diseases, but that it has an equally deleterious effect in promulgating the evil of all diseases, and weakening the system so that it is less capable of withstanding the ravages of disease, chronic as well as acute. It is fear that they are worse than they really are; fear that the doctor won't do all he can for them; fear that this or that remedy will not bring the desired result. So it is fear, morning, noon, and night, that increases the tension of the nervous system, and to no small extent blocks the wheels of nature's work for the individual.

On first thought most people would be inclined to doubt these statements, notwithstanding there are so many every-day common experiences to sustain it; and, indeed, we do not think it incredible when we realize the personality of the mind throughout the body. We were caused a few days since to think along these lines, when asked by a patient: "Why is it, doctor, that the harder I try to get well, the worse I get? I have been doing everything I can do, and the more I try, the more I feel that I am in a deplorably diseased condition." "Yes," we said; "we have noticed this in not a few cases." The more they try without any positive definite foundation upon which to work, and without real facts upon which to rest, and the more inclined they are to take the advice of everybody who professes to have been suffering in the same way, because they have no foundation for themselves upon which to base any courage, the greater the fear that they cannot get well; and the consequent false symptoms that are sure to come are magnified and intensified until everything about the system seems to say to them, "I am getting worse instead of better."

But when we consider the personality of the individual as a complete organism, how the vital forces act and react upon the body—for this is the force that makes every part alive and active—flowing as it were from nerve centres to various other organs and tissues of the body, very much like the magnetic forces that sweep over the earth that help make the wonderful changes that are wrought in wind, wave, and elements—is it any wonder, then, that the influence of fear over the vital force flowing through the body will produce the halting of the function, the weakening of the function, until it is noticed by the excitable and suspicious nerve endings that were made to convey even the most delicate impressions to the nervous system? Has it not, then, been abundantly demonstrated that the sense of fear on any and all of the functions under the vital forces, is always a sense of weakness, a sense of imperfect action, a lack of confidence or faith, which brings about the halting, trembling function, while the element of confidence, on the other hand, is, indeed, strength, faith, and unity of action in every function of the system?

If we in imagination were to pay a visit to the various organs of the body, and there study their functions, we would see every organ in a sense independent of every other organ, so that, in fact, each has an individuality of its own. The liver cells carry on a work foreign in nature to the stomach cells, and the stomach cells a work foreign to lung cells, and so on through the body; yet all the organs are tied together under one common fountain of vital force, so that in health there is perfect harmony and sympathy. Being so, it will now be easy to see that the stomach, for example, if it had an individuality of its own, would act very much like the worker, for instance, in a carpenter-shop or shirt factory, if the president or superintendent should come in and watch every move that he made, with the attitude or feeling that it would not be done right. Invariably the operator would be embarrassed, and by the very nature of his environment could not do the work as well as he could if the superintendent did not stand over him, expressing his doubts and fears. Just so intimately connected is the work of the stomach or liver of the individual with his mind; and the sense of fear, the sense of grief, the sense of joy are influences which act and react in varied degrees of intensity, but always surely, upon the various organs of the body.

If fear on the part of the individual depresses the vitality, depletes the fund of confidence, and renders the system halting, so that it is less toned, and consequently weakened in its power to resist contagious diseases, then why may we not reasonably conclude that fear of the stomach's not doing good work will have a depressing effect upon the stomach, or fear that the liver is not doing good work will have a depressing effect upon the liver? Each of these conditions carries with it a lack of confidence or faith in the function. May we not learn the lesson that when we have eaten what we think we ought to take, to fully believe that the alimentary canal will do its work properly? But the continual fear that exercises the minds of most individuals with chronic diseases, and for which many doctors are to a great extent to blame, always works against the getting well process, and lessens the chances of otherwise reasonable recovery.—*Pacific Health Jour.*

THE PROPER DISPOSAL OF THE DEAD.

It is quite remarkable in view of the repeated discussion of the subject of cremation and the well-known and widely appreciated advantages of the method that comparatively little progress has been made in the direction of its more extended adoption.

Every little while its advocates come to the front with their missionary endeavors to argue against the deeply rooted sentiment attached to earth burial and are brought up helplessly against the barrier of settled prejudice as the only answer to the most reasonable of expedients. The scientific aspect of the question challenges dispute. The fact that the sooner a decaying body is disposed of the better is as incontrovertible as that of death itself. Decomposition indicates this in its own imperative way. The dead body is no longer scientifically, sentimentally, or religiously a part of the individual, any more than is his cast-off shoe or worn-out garment. The attempt to preserve its identity in any form is a libel on natural laws. Its progressive change from the human form divine to a bloated loathsome mass of oozing corruption proves with the force of a physical fact that material and individual dissolution is absolutely inevitable. The result must always be dust to dust, ashes to ashes. Fortunately for the purely sentimental aspect of this question the slowly decomposing body, with its attendant changes of form, substance, and lovable associations, is hidden from sight and its true object lesson is entirely lost upon the mourning survivors. Thus we cheat ourselves into the belief that the body, as such, is not entirely gone from us and that there is some more substantial medium than mere primitive elements, dust and ashes, between us and the one that is literally no more. It is the association of the tomb with the earthly home of the departed one and the last look of a loved face.

A day or two of additional time would result in the more becoming resignation of a cherished memory to the very tangible evidence of a distressing fact. The realization of advanced decomposition would bring about the proper vindication of the scientific objection to burial as now practised and the demonstration of the dangers to the living by the more or less extensive soil contamination that necessarily follows.

In the last number of the *Journal of the American Public Health Association* there are two articles bearing upon the subject of dead-body disposal that contain many interesting data for profitable study. One of these is by Dr. C. O. Probst, the other by Dr. Edward A. Guilbert. Both gentlemen are advocates of cremation and present the usual forcible arguments for their side. The former writer, while willing to lean conservatively toward the prevailing prejudice of earth burial by the admission that under certain conditions it is safe and satisfactory, is nevertheless strongly committed to cremation as a better and more cleanly method of disposing of the dead. Admitting that under favorable circumstances of sandy soil, isolated situations, distance from water-supplies of towns, and possible destruction of many varieties of pathogenic germs, earth burial fulfils certain requirements, how much greater certainty of complete security for the living is proven by the rapid and absolute destruction by incineration of all probable cause of disease propagation! There is but one answer to the question and all argument ends with it. Dr. Guilbert not only discusses the sanitary but also the religious and sentimental aspects of cremation. In view of the fact that the opposers of incineration have been unable to combat the widely acknowledged sanitary advantages of the measure, they have taken refuge in an appeal to the prejudices that attach themselves to old customs, tender associations, and religious rites. The writer in question has clearly shown that, so far from cremation interfering with Christian rites, it has been openly advocated by leading members of every religious faith. Hardly a better answer can be offered to such as have endeavored to make earth burial a test of Christianity than is contained in the following paragraph:

"The Bishop of Lincoln, England, 1874, during the dawn of the reform, evolved from his inner consciousness the surprising ex-cathedra statement 'that a revival of cremation would destroy belief in a final resurrection'! He forgot, in his affirmation of faith, be it said, to answer Earl Shaftesbury's pertinent question, 'What has become of the blessed martyrs?' I might add, Where are the innumerable, they, the Christian men, women, and little children, who have suffered death in conflagrations on land and sea? Is that inscrutable essence within man, the myself, the very life, which thinks and impels, loves and hates, and which we call the soul—is that really 'of the earth, earthy' and is it positively annihilated when the cremated body gently fades away, 'like the fabric of a vision, leaving no wrack behind'? If the soul of the martyr died when his body burned at the stake, what meaning is there in the liturgical averment, 'The noble army of martyrs praise thee. That which has been annihilated can neither 'praise' nor blame."—*Med. Record.*

RETRIBUTION.

In every life each deed, each word, each thought
Bears ever fruitful harvest of its kind,
Its nature stamped upon the heart and mind,
Ever remains with good or evil fraught.
Man's soul is but the sum of life below,
We are just what we daily, hourly live,
Nor may we other recompense receive
But reproduction of the seed we sow.
Who soweth to the flesh, of flesh shall reap
Corruption—he who to the spirit sows
In everlasting life his soul shall keep—
For by its fruit the tree its nature shows.
Man makes eternal character in time,
Dies as he lives, degraded or sublime!

—*Thomas Osmond Summers.*

THE PHYSICIAN'S RELATION TO SOCIETY.

THE following admirable passages from President C. W. Eliot's address before the Medical Society of the State of New York* is an excellent statement of the advantages which the modern physician's training and work give him as an adviser against moral and social evils to which society is subject. He says:

"The trusted physician sees intimately many classes of society, whether he live in the country or the city. In the city he sees the well-to-do in their houses and the poor at the hospitals and dispensaries. In the country he visits all the different kinds of people in the town. The experienced physician is familiar with the causes of poverty and misery, and he is equally familiar with the ill-effects of wealth and ease unaccompanied by mental and spiritual cultivation. He can recognize the socially normal and the socially abnormal, and distinguish unerringly between them. In the city he knows the evils which result from crowded tenements and dark, ill-ventilated working places; in the country he knows all about the wet cellars in which decaying fruits and vegetables are stored; the bad cooking; and the careless disposition of the household sewage on the surface of the ground near the dwelling. He should be the best adviser on all social defences against the physical evils which the greed, ignorance, or carelessness of individuals inflict on the community; on the building of hospitals, large or small, in city or country; and on the training of competent nurses, whether for hospital or family service. The physician should be the chief defender of society against the superstitions which still prevail and the impostures which still thrive. His training being essentially the training of the naturalist, he should be the defender of the community against all forms of unreason. If the physician have the needed persuasive force, no one can defend society so effectually as he against those unreasonable persons who are constantly protesting against dissection, vaccination, and vivisection; for no one can understand so well as the physician the benefits which these processes have conferred upon the human race."

With regard to the medical profession as a career for young men, President Eliot says:

"The medical professon has before it an entrancing prospect of usefulness and honor. It offers to young men the largest opportunities for disinterested, devoted, and heroic service. The times are past when men had to go to war to give evidence of endurance, or courage, or capacity to think quickly and well under pressure of responsibility and danger. The fields open to the physician and surgeon now give ample scope for these lofty qualities.

"The times are past when the Church alone asked men to devote themselves patiently, disinterestedly, and bravely to the service of their fellow-men. The medical profession now exhibits in highest degree these virtues. Our nation sometimes seems tempted to seek in war—that stupid and horrible savagery!—for other greatness than can come from vast natural resources, prosperous industries, and expanding commerce. The pursuits of peace seem to pall for lack of risk and adventure. Would it might turn its energies and its longing for patriotic and heroic emotion into the immense fields of beneficent activity which sanitation, preventive medicine, and comparative medicine offer it! There are spiritual and physical triumphs to be won in these fields infinitely higher than any which war can offer; for they will be triumphs of construction and preservation, not of destruction and ruin. They will be triumphs of good over evil, and of happiness over misery."

THE TRUE AIM OF SICK-ROOM DISINFECTION.

THE *London Lancet* has attempted an analysis of the latest improvements for the practical disinfection of living-rooms. In its editorial columns it is remarked that the frequency with which second and third cases of scarlet fever or "recurrences" appear in houses that have been disinfected by the inspectors of sanitary authorities casts grave doubts on the efficacy of procedure usually adopted, despite its official sanction. Stripping the walls, lime-washing walls and ceilings, and scrubbing woodwork and floor boards with soap and water are indeed effectual enough, and to these when thoroughly done we are disposed to ascribe any successful results rather than to the more technical process of so-called disinfection by sulphur fumes, which is little better than a superstitious rite or incantation shorn of religious character. But in the light of bacteriologic experiments dry sulphurous acid fumes, whether generated by burning sulphur or carbonic acid sulphid, or, as has of late become the fashion, by opening cylinders of the compressed gas, are for all practical purposes useless. The gas would act as a powerful germicide on articles or fabrics previously saturated with water, but its bleaching action precludes its employment in this way with colored material, carpets or curtains, and it is as what is called an "aerial disinfectant" that it holds its ground in popular esteem. But aerial disinfection is an absurdity; no one wants to purify the foul air, which is easily enough removed by simple ventilation. In disinfecting a room the true aim is to kill the germs contained in dust on ledges or in the crevices between the boards, or adhering to the walls and other surfaces, and the dry gas is powerless to do this, which is best obtained by a sublimate solution of the strength of one part in 1000, or by lime- (not white-) washing, providing the lime be freshly burnt and caustic, the carbonate of lime, or chalk, used in white-washing under the name of whiting, and into which lime is converted by long exposure to the air, being inert. The series of experiments on the infection and disinfection by various means of wall-paper, distempers, and other wall surfaces conducted by Dr. Kronberg, under the direction of the late Prof. Uffelmann, at Rostock, showed that subsequent scrapings were invariably and almost instantaneously sterilized by washing or spraying with the sublimate solution, and equally so by the lime-wash after the lapse of twelve or twenty-four hours. *The danger of corrosive sublimate is we believe exaggerated;* since the smallest fatal dose for an adult being probably three to five grains—equal to at least a quarter of a pint of the solution—accidental poisoning with the solution is practically not probable, and as a further safeguard it might be colored with indigo or "laundry blue." Carbolic acid, which is sold without restraint and is in universal use, is more dangerous on that account, and is, indeed, frequently employed with suicidal intent and with fatal effects. In France, Germany, and Italy sublimate has nearly superseded all other disinfectants, and its neglect in this country is inexplicable. As to carpets, bedding, and clothing, all that is capable of being washed should be plunged into a copper of boiling water for a quarter of an hour, and such articles as would be spoiled by this treatment should be disinfected by steam.

---

* *American Medico-Surgical Bulletin*, February 1, 1896.

This point in reference to the powers of sulphurous acid gas, whether dry or moist, will in the future, we think, receive a fuller consideration than it has had in the past, namely, that it leads to a prolonged aeration on the part of the occupant after the officials have left the premises. Here we have an aerial disinfectant that is a clear gain, supplementary and complementary to the routine work of the disinfecting staff.—*Jour. Am. Med. Assn.*

CURIOUS THINGS IN HORTICULTURE—SEX IN PLANT LIFE.

THE intelligent fruit-raiser finds many puzzling things in his studies of vegetation. He finds that a sweet apple grafted on a sour-apple tree grows a sweet apple.

He finds that the scion of one kind of apple grafted on another kind will dominate the root (or stock), so as to change its form—making the roots grow straight and compact like the roots of the parent scion rather than sprawling like the parent of the stock.

He finds that by taking two scions from different trees, one sweet and one sour, and dividing the scions lengthwise just alike and joining them to a perfect point and using it as one scion, the fruit on that scion will be a combination of both kinds of fruit in size, color, and taste.

He finds many remarkable things in regard to the pollenization of fruit and flowers. This subject is treated at length in Bulletin No. 5, division of pathology, U. S. Department of Agriculture. In this connection we quote from Dr. J. R. Cardwell's last annual report as president of the Oregon State Board of Horticulture:

"The law of sex applies to the vegetable kingdom as fully and irrevocably as to the animal, and a definite result in obtaining new varieties or improved quality is just as certain in the matter of fruit by cross-fertilization as improvement of animals by domestication. In the vegetable as in the animal, breeding-in leads to impotency and sterility. Most of the improved varieties of fruit, especially pears and apples, are self-sterile, and must be cross-pollinated with other varieties to produce fruit. Even the self-sterile kinds are more productive and the fruit larger when cross-pollinated. For this reason large blocks of trees of one kind should not be set, but if they are, each tree should have one or two grafts of another variety blooming at the same time, and after careful study the most prepotent fertilizer should be selected for the desired cross. All large orchards should be set with an occasional row of the desired prepotent pollinating tree."

FRUIT AS MEDICINE.

WHY for ages have people eaten apple sauce with their roast goose and sucking pig? Simply because the acids and peptones in the fruit assist in digesting the fats so abundant in this kind of food. For the same reason at the end of a heavy dinner we eat our cooked fruits, and when we want their digestive action even more developed we take them after dinner in their natural uncooked state as dessert. In the past ages instinct has taught men to do this; to-day science tells them why they did it, and this same science tells us that fruit should be eaten as an aid to digestion of other foods much more than it is now. Cultivated fruits, such as apples, pears, cherries, strawberries, grapes, etc., contain on analysis very similar proportions of the same ingredients, which are about one per cent. of malic and other acids, and one per cent. of flesh-forming albuminoids, with over eighty per cent. of water.

Digestion depends upon the action of pepsin in the stomach. Fats are digested by these acids and the bile from the liver. Now, the acids and peptones in fruit peculiarly assist the acids of the stomach. Only lately even royalty has been taking lemon juice in tea instead of sugar, and lemon juice has been prescribed largely by physicians to help weak digestion, simply because these acids exist very abundantly in the lemon.—*Pop. Sci. Monthly.*

ROYAL COMMISSION ON TUBERCULOSIS.

THE report of the Royal Commission on Tuberculosis in England shows conclusively, says the *British Medical Journal*, that the using of milk from tuberculous udders is quite as serious as the most pessimistic had imagined; that the infective bacilli, originally in the milk, are found in butter and other milk products, and give rise to tuberculosis in those that partake of them; that the presence of tuberculous glands and foci in meat may prove dangerous by being disseminated through the eatables by infected butcher-knives being used; that the bacilli may be only partially devitalized by cooking, as shown by the frequency of tonsillar tuberculosis in pigs. The precautions indicated are to weed out all tuberculous animals from stock, dairies, and markets, and the confiscation of all tuberculous carcases. To this end the registration of slaughter-houses, cattle-sheds, and dairies should be enforced, and inspection made by skilled veterinary men. Tuberculin is recommended as a diagnostic agent.

THE PHYSIOLOGY OF TEARS.

A NATURAL OUTLET FOR THE RELIEF OF EMOTIONAL TENSION.

The subject is considered in a bright and interesting paper recently published in the *Asclepaid.* Fear, grief, and joy, to say nothing of pathos and anger, bring tears to the eyes. They are said to come from the heart, and this is true, for no one ever reasoned himself into weeping without a first appeal through the imagination to some emotion. Tears are the natural outlet of emotional tension. They are the result of a storm in the central nervous system, giving rise to changes in the vascular terminals of the tear-secreting glands. These changes induce profuse exertion of water, and weeping results. In a mild degree some excretion is always in process to bathe the eye and clear it of foreign matters. The controlling centre is at a distance, though the secretion may be kept up by the small trace of saline substance that is present in the tears themselves. The lachrymal glands lie between the nervous centre and the mucous surface of the eyeball. Tears afford a good illustration of the way in which nervous fibres are capable of conveying to a secreting organ exciting impulses from both sides of a gland lying in their course. Afferent and efferent communications bring about a similar result. Internal nervous vibrations and external excitation or reflex action cause a flow of tears. In both instances the exciting impulse is a vibration. Niobe, all tears, and the unfortunate pedestrian with a minute particle of steel from the rail of an elevated road in his eye are unwilling exponents of a similar process. They weep the same kind of briny fluid, in exactly the same way, though from widely different causes. Imagination is at times sufficient to excite the nervous system into the production of tears without external aid or reflex. Writers and readers of good fiction weep over it alive, and the actor loses himself so completely in the exigencies of dramatic art that he sheds real tears and the audience sheds tears with him. Of a truth the man who never weeps has a hard heart and the quality of his intellect may also be questioned.

Emotion, then, affection, grief, anxiety, incite to tears, not pain or discomfort. The pangs of maternity are tearless, though the influence of ether or chloroform may cause some emotional dream that results in weeping. In the earlier days of surgery patients might scream and utter such pitiful cries as to sicken the by-standers, might even faint with pain, yet there were seldom any tears. These, being pure waves of emotion and a relief to the heart, are almost powerless to mitigate pain. Perhaps one who weeps from pain does so from unconscious, though selfish, pity — in other words, from emotion.

For the tearful, change of scene, mental diversion and outdoor life are the best remedies. The author quoted objects to alcohol as fearfully injurious. It disturbs and unbalances the nervous system, keeps up a maudlin and pitiful sentimentality and sustains the evil. Alcohol is the mother of sorrow. An opiate, however, prescribed at night soothes and controls and really disciplines rebellious nerve-centres. Sleep cures tears. And so does Time, the restorer. Persons subjected to many and repeated griefs forget how to weep, and the old as compared with the young are almost tearless. Tears have their value in the life of humanity, not as tears, but as signs. They show that grief-centres are being relieved of their sensibility, and that the nervous organization is learning how to bear up against sorrow.—*N. Y. Med. Jour.*

TO ESTIMATE THE DAMPNESS OF A HOUSE.

Physicians are sometimes requested to estimate the relative dampness of an apartment or room. This is not always easy by simple inspection, as a room may be damp although saltpetre does not grow on its walls or mould in its corners. The following is an exact means of appreciation and one that is within every one's scope. In the room in question a kilogram of fresh lime should be placed after hermetically closing doors and windows. In twenty-four hours it should be weighed, and if the kilogram has absorbed more than ten grams of water (that is, more than one per cent.), the room should be considered damp, and classed as unhealthy.

The question of the dampness of dwellings is a frequent cause of dispute between landlord and tenant, naturally solved in the affirmative by the latter, and in the negative by the former.

The question can be settled in the future by the test of the hydration of lime, of of which I have just spoken, and which will give irrefutable proof of the validity of such complaint. — *European Edition New York Herald.*

AGAINST MOTHS.

The time has come to protect winter clothing against moths. It seems to be a universal belief that camphor, or that horrible smelling stuff, white tar balls, will keep moths away from clothing. This is a fallacy. After three years of careful experiment and close observation, the result shows that *smelling stuffs* have no influence on moths.

The true method of protection is a vigorous beating of the garment in the outdoor air, then a careful brushing, then a washing out of grease-spots with soap, ammonia, or borax-water, quite warm. *Moth worms* dearly love a dirty grease-spot. Indeed, it is the best economy to send garments to practical cleaners, who use benzine. It is not safe to use benzine at home, it is a dangerous article in unskilled hands.

Having thus cleansed the garment, then carefully and tightly wrap it in a *double-thickness* of newspaper. Don't paste the edges of the wrapping-paper, for mice are likely to eat the paste and spoil the package. The importance of cleaning before packing lies in the fact that the eggs of the moths may have been laid in the garment, and it is the little worm hatched from these eggs that eats the cloth—it is his food.

The moth-miller you see flying is looking for a comfortable place upon which to deposit her eggs. Catch Miss Moth as she flies, and interrupt her ovarian intention by death.

Moths do not attack sealskin, but they seem to like all other kinds of fur.

In putting away *sealskins* do not brush but just give them a good beating and hang up in a paper or muslin bag without folding.

Carpet bugs like the red woollen yarn in carpet better than any other color. It is, therefore, a good plan to loosen the carpets from the floor near the walls and lay down here a few strips of red flannel. It is important to frequently brush up the floor and *burn* the dust; thus you destroy the eggs.

PHYSIOLOGY OF CHILDHOOD.

There is scarcely an organ which behaves in the young as it does in later life. They are more delicately organized, and contain a larger proportion of water and are more easily injured. The bones contain less earthy matter, animal matter predominating. The brain is being rapidly developed, much more so than any other organ. The arterial pressure is not so great. The digestive organs of infants present many peculiarities. The digestive glands are but gradually prepared for their functions. The salivary glands are only partially active. The secretions of the stomach contain more lactic than muriatic acid. The stomach is less elongated and occupies a more vertical position than in the adult, hence vomiting is more frequent, more readily produced, and causes less disturbance to the general system. The liver is much larger in proportion to the size of the body than it is in adult life. All of these differences must be taken into consideration in treating infants and children, and necessitates changes in remedies and doses.

Pharmaceutic Reviews.

BONE-MARROW.

A LECTURE on "Bone-Marrow in the Treatment of Various Forms of Anæmia," by John A. Robinson, A.M., M.D., Professor of Medicine, Rush Medical College, and Post-Graduate Medical School, Chicago; Attending Physician to the Presbyterian and Cook County Hospitals, etc. Published for the medical profession by Armour & Company, Chicago. Copies will be sent upon application.

No more important subject has been presented for the consideration of physicians than that which covers the treatment of that pernicious abnormal condition known as *anæmia*—a struggle for life against the enemy, malnutrition. The pamphlet before us is a valuable and most timely disquisition on a food that has proven both in England and in this country to be a perfect nutrient in those cases of malnutrition and depressed vitality which are so difficult of treatment by the physician and so alarming to the patient. Physicians should send to Armour & Company for Dr. Robinson's lecture, for it is a thoroughly exhaustive treatise on the use of bone marrow for *anæmia.*

"LISTERINE."

UNDER the trade-name of *Listerine* the Lambert Pharmacal Company, of St. Louis, Mo., have now for many years placed at the command of the medical practitioner and for use in the home a most perfect *antiseptic* preparation, which has the great advantage of being perfectly harmless in the event of its improper use. The manufacturers print upon their bottles the formula which constitutes *Listerine*, as follows:

FORMULA.

Thyme. Eucalyptus. Baptisia. Gaultheria.
Mentha-Arvensis and Benzo-Boracic Acid.

This combination must appeal to the intelligent physician as a guarantee of pharmacal value for external and internal abnormalities which indicate an antiseptic treatment. This being true, it is all-important that *Listerine* be purchased in the original bottles, for the manufacturers have found that a great many dishonest druggists have and continue to destroy its efficacy by dilution and attempts at simulation. This cannot be done successfully, for the very essence of the pharmaceutical value of *Listerine* lies in the skill with which it is compounded, hence the importance of its use from the original package. The *Lambert Pharmacal Company* will take pleasure in sending to any physician or other interested consumer instructive literature as to the medical value of *Listerine.*

NUTRITIVE VALUE OF ALBUMOSES.

By DE BUCK.

THE author employed somatose in the treatment of seven cases of typhoid fever. Three of the patients were adults between 21 and 24 years of age; four were children between 6 and 10 years. The daily dose was between three and four teaspoonfuls. This was administered in weak bouillon or diluted milk, in quantities not exceeding an amount sufficient to make a saturated solution. The administration was continued during the whole course of the disease and convalescence. Thirst was appeased with boiled water, to which, after cooling, about 4 per cent. of saccharose was added. In six of the patients the disease ran a perfectly normal course of average duration—about 22 days. The author was convinced that, in a general way, the temperature was less elevated by this method of treatment than by the exhibition of comparatively large quantities of bouillon and milk as were formerly administered in typhoid fever.

Diarrhœa was lessened, and in no case were disagreeable symptoms from the stomach and intestines observed. In two cases there was a slight tendency to constipation.

In the third week one of the adults, a male, 23 years of age, developed pleuro-pneumonia, which resulted fatally. The patients did not develop a dislike for the somatose, even though it was continued for a long time, and the appetite was rather increased than diminished. The patients' strength was retained on this almost exclusive diet of somatose, and convalescence was relatively short. When the patients were gradually put on solid diet, no tendency to relapse was observed. It may also be remarked in this connection that six cases which pursued a normal course to recovery received no other medication. The author also reports several cases of other affections where the nutritive value of somatose is equally apparent.—*Wien. med. Presse*, 1896, No. 6.

HYOSCINE HYDROBROMATE was admitted to the United States Pharmacopœia, 1890. The German Pharmacopœia of the same issue also made this product official, but in a Supplement, issued a year later, the Pharmacopœia Commission adopted the name *Scopolamine Hydrobromate* to replace "Hyoscine." The reason for this change is that nearly all the Hyoscine supplied by manufacturing chemists is made from *Scopolia Atropoides*, and hence "Scopolamine" more correctly indicates the source of the alkaloid. In this country the name "Hyoscine" is, moreover, alleged to be a trade-mark, and as a consequence it is sold at an exceptionally high price. C. F. Boehringer & Soehne, taking these facts into consideration, have recently put in stock this product labelled thus: "SCOPOLAMINE HYDROBROMATE, identical with HYOSCINE HYDROBROM., U. S. P.," and their product (Specify B. & S.) is obtainable in 5, 10, and 15 grain vials from wholesale druggists throughout this country at about half the price quoted for Hyoscine.

THE SPITTING NUISANCE.

THE Boards of Health in all parts of the country agree that consumption is an infectious and communicable disease, and is usually transmitted from the sick to the well, by means of the dried and pulverized sputum floating as dust in the air.

This being the case, it can in a great measure be restricted by the use of proper disinfectants. PLATT'S CHLORIDES, one part to ten of water, frequently sprinkled about the room, and the same disinfectant, one part to four of water, in the cuspidor or vessel receiving the poisonous and offensive expectorations, is especially applicable, as it is a liquid without odor or color, and its frequent use is not attended with any annoying features.

MALT-NUTRINE.

ONE of the most gratifying occurrences to the medical profession and the educated laity has been the advent of the Anheuser-Busch's "Malt-Nutrine." Not content with making the finest beers in the world, the Anheuser-Busch Brewing Association have now entered a domain in which their enormous capabilities, skill, pluck, and advanced ideas have created a revolution.

Medical men have long deplored the fact that the malt-extracts at their command were open to a number of objections. They desired a malt that should be a food and a non-alcoholic stimulant, in a palatable form. Recognizing the wants of the profession, the A.-B. B. A. have produced the ideal malt preparation, and the only one that fully comes up to the standard set by the profession—*i.e.*, palatable, rich in extract, and non-intoxicating. The market is flooded with so-called malt extracts, which are simply alcoholic stimulants, and others, of a kind which physicians do not care to use.

The stimulation consequent upon nutrition is what the physician desires in the majority of cases, and that is obtained in the highest degree from the use of Malt-Nutrine, which is so easily assimilated that the digestive organs are not taxed.

In insomnia, general debility, nervousness, and the many neurotic ailments, Malt-Nutrine is recommended by our most prominent physicians as the malt-extract *par excellence*.

THE
DIETETIC AND HYGIENIC GAZETTE
A MONTHLY JOURNAL OF PHYSIOLOGICAL MEDICINE

VOL. XII. NEW YORK, JULY, 1896. No. 7

THE PURIFICATION OF DRINKING-WATER.

BY J. HOBART EGBERT, A.M., M.D., PH.D.,
HOLYOKE, MASS.

NOT long ago a teacher in one of our public schools asked a male member of her class the question, "What is a reservoir?" It happened that on the preceding day when she had discoursed to some extent about springs, wells, and reservoirs, this youngster had been detained at home to nurse an aching tooth, and his unique and fitting reply was somewhat of a surprise. His answer was, "A reservoir is a pond where the boys go fishing." The teacher knew the city reservoir and was well acquainted with the water flowing from it, and hence did not question the propriety of this definition; neither do we. Surely reservoirs are ponds which contain fish, and from many of them, at least, the fish are taken by anglers, both young and old.

Pond-water is always impure. Aside from many possible mineral impurities quite likely to occur—the presence of which, in drinking-water, we will regard as harmless—organic impurities which may prove a constant menace to health are also likely to exist. Any water which contains more than one grain of organic matter per gallon can hardly be rated as a first-class drinking-water, and yet analyses show that the water drawn from city reservoirs frequently contains over ten grains of organic matter to the gallon. The presence of organic matter is easily shown. Aside from the analytical methods of the chemist there are simpler tests which all, through the due exercise of the senses of sight and smell, may apply. The odor which organic impurities impart to water—especially noticeable when the water is corked in a bottle or jug and kept for a few days in a moderately warm place—affords a simple and quite reliable way of determining their presence. Reservoir-water often gives certain evidence of organic pollution to the sense of smell whenever one puts his nose into a tumbler, as we all do in the usual manner of drinking—an evidence which the palate usually confirms. But organic impurities in water, when in excess, can be seen as well as smelt and tasted. Fill a pint bottle of clear white glass with such water as we are considering, let it stand uncorked over night, and in the morning a liberal deposit of organic débris can usually be seen with the naked eye in the bottom of the bottle. Previously boiling the water will cause a more rapid precipitation of the sediment. When water is distilled in a glass retort organic débris can usually be distinguished in the sediment remaining after the distillate has passed over.

For the more exact determination of organic pollution of drinking-water chemical analysis is necessary. A ready method is as follows: To some of the water to be examined in a test-tube add a few drops of a weak solution of permanganate of potash and note the extent to which the original pinkish or purplish tint is changed to a brownish color, and the rapidity with which the change takes place. Organic matter in water decomposes small amounts of the permanganate and weakens or destroys the characteristic color which it at first imparts to the water.

For the determination of the amount of organic matter present in drinking-water a method known to chemists as the "Wanklyn process" is usually employed. The principle of this method consists in the measurement of the nitrogenous organic matter in water by determining the amount of ammonia yielded by the destruction of the organic matter.

Fortunately, the burden of organic pollution in isolated pond reservoirs is likely to be of vegetable origin. The streams which supply the ponds, running through wooded regions or lowlands rich in vegetation, naturally carry a good proportion of vegetable débris; while degeneration of the vegetation in and about the reservoirs adds its share of pollution. But the water in reservoirs is quite likely to be contaminated by decomposing animal matter and pathogenic bacteria derived therefrom, and also rendered unwholesome by the presence of noxious gases, and objectionable, to say the least, by myriads of micro-organisms—other than bacteria—which exist within and upon the water.

It is not our present purpose to discuss at length the various sources of contamination of drinking-water, nor to present an elaborate treatise on the analysis of potable waters; we do wish, however, to demonstrate that drinking-water is likely to be contaminated and to show how serious such contamination may be.

From the organic impurities of animal origin which frequently pollute reservoirs and river water-supplies arise dysentery, diarrhœa, typhoid fever, and cholera, and various specific fevers and other diseases which may be transmitted through the excreta of animals, including man; to the noxious gases which originate in pond-water may be traced malaria and kindred disorders; while the living germs of intestinal worms, thread-worms, and other dangerous animal parasites which may be carried by animals, birds, and insects, may be taken directly into the system, to develop into active, working parasites, by simply drinking water as it comes from reservoir or river. Besides reservoirs, wells—particularly shallow and surface wells—are likely to be contaminated to a frightful extent by leakage from drains, cesspools, ash-pits, privy-vaults, barnyards, etc.; while rivers flowing through populous districts often become contaminated with sewage to such an extent as to make them positively offensive as well as dangerous to those who drink the water. It is true that running water tends to purify itself by oxidation and dilution of the contained organic matter. Thus, in a river of a moderate size, all dead organic matter will be oxidized and rendered innocuous within ten or twelve miles of the source of contamination. Concerning the action of running water upon living germs, however, some question still remains. The Committee of the American Public Health Association on Water-Supply have endorsed the opinion of the English sanitary authorities, viz.: that rivers which have received sewage, even if that sewage has been purified before its discharge, are not safe sources of potable water.

It is doubtful whether there is any known method for the wholesale purification of water polluted by excrementitious and similar deleterious matters which is sufficiently effective to warrant the use, for dietetic purposes, of water which has been so contaminated, without subjecting it to careful preparation at the time of using it—hence the necessity of a pure water-supply.

Good clear, sparkling spring-water is, doubtless, the purest and best natural water for drinking purposes. In fact, pure spring-water is the most healthful and refreshing beverage in the world. Such water is more abundant than is usually supposed, and it will be a great blessing to mankind when its use shall have become general or universal for drinking purposes. Spring-water is not "pure" in a chemical sense, for it always contains soluble mineral salts, derived from the soil, and to which it owes its sparkling, pleasing taste, but good spring-water is devoid of those organic impurities which induce disease and otherwise injure health.

Next in wholesomeness to spring-water we would place rain-water, collected in well-constructed and properly appointed cisterns. Rain-water is, however, by no means absolutely pure. From the air it gathers solid particles of dust, various gases, the germs of animals and pollen of plants ; while dust, decaying leaves, and other débris are likely to be carried by it from the eaves and pipes through which it flows. In order to secure the purest supply of rain-water for cisterns the first rain that falls during a shower should not be allowed to reach the cistern, but should flow out through the roof-pipes upon the ground or into the drain, and only after the roof has been washed and the supply-pipes flushed out should the water be turned into the cistern. The first portion of the rain falling also carries the largest amount of impurities derived from the atmosphere. The walls and bottoms of cisterns should be cemented perfectly tight in order to prevent all possible contamination from impure soil or surface water, sewage, etc., and they should be emptied and thoroughly cleaned about once a year.

Wells, as water-supplies, deserve a moment's consideration. There are open wells and driven wells. The water in ordinary open wells is derived partly from springs and partly from surface drainage, and hence is suitable for drinking purposes only when occurring in sparsely populated localities, and then only when uncontaminated by house refuse, sewage, and drainage from cesspools, privies, barnyards, graveyards, etc. Driven wells have two particular advantages: they reduce the amount of organic contamination to a minimum and they are cheap ; they must not, however, be too shallow. Deep artesian wells which bring water from deep lying strata supplied from a distance are usually free from all the organic impurities of ordinary well-water, though they may contain so much mineral matter as to render them unfit for domestic use. The water from artesian wells is particularly good when derived from a deep bed of sand or gravel encased between two layers of clay or rock impervious to water. The slope of the layers must be such that the place where the well reaches the pervious stratum is lower than the point where the water is first collected in the soil. In New York City and a few other places artesian wells are not very successful owing to the almost vertical direction of the strata.

Purity of the general water-supply of cities is a matter of highest importance. Even if reservoirs for supplying cities with water are a necessity, it does not follow that the inhabitants of those cities must drink impure pond or river water. Reservoirs may be so constructed and arranged as to furnish good drinking-water. To this end they should be made to resemble immense springs rather than large frog-ponds. The reservoir basin must be in good firm ground and not in a swamp ; it should have a good natural bottom of sand or gravel—not mud—or an artificial one of stone ; the streams supplying it should carry only good spring-water, and surface-water should, as far as possible, be prevented from flowing directly into it ; vegetation within the reservoir should be limited to such plants as thrive in springs or be entirely abolished ; bathing, fishing, and every possible source of pollution should be prohibited and guarded against. But this is not all. Reservoir-water should be carefully filtered before reaching the main and should also be converted into *running* water before being filtered. This may be effected by having the water *flow* from reservoir to filter along a broad, long, inclined canal of carefully hewn and fitted stone. Thus thorough oxygenation of the water and release of all noxious gases may be effected.

But granting, as we must frequently do, that the water-supply is not free from dangerous organic pollution, how is it to be purified and rendered fit for domestic use? This must be done by boiling and filtering the water before using it. The drinking-water supplied most cities at the present time should be at least thoroughly filtered, and usually both boiled and filtered before drinking it. Boiling destroys disease germs and renders harmless organic poisons ; filtering removes the sand, vegetable débris, and other particles which the water holds in suspension. If the water is boiled, the only filtering usually necessary will be such as can be effected by the ordinary faucet filter. The water is run through the filter, boiled in a tea-kettle or other convenient vessel, and then put into jars or jugs of stone and allowed to cool. Ice may be added to the water as used or the containing vessel may be set in ice.

The ordinary faucet filter is not sufficient to remove from water all objectionable impurities, and where the water is not prepared by boiling, and frequently when it is boiled, it should be run through a good ample filter. Such a filter may be had from dealers or may be made at home for a trifling outlay of time and money. For domestic use perhaps none is better than the home-made filter suggested by that eminent sanitarist, Dr. Parkes. It is made as follows:

Take a large common flower-pot and cover the bottom—including the opening—with a piece of zinc gauze or clean piece of flannel. Over this put coarse gravel to the depth of nearly three inches, and over that the same amount of white sand, washed very clean; next, add four inches of charcoal in small fragments—animal charcoal when it can be had. On the top of all a piece of well-cleaned sponge may be placed, which should be changed or thoroughly cleansed at least once a week. The sponge is not absolutely essential, and may be replaced by a layer of clean flannel or dispensed with entirely. The completed filter may now be set in a wooden frame, beneath which may be placed a suitable vessel to receive the water as it flows from the opening in the bottom of the flower-pot—which has now been converted into a thoroughly useful filter.

In conclusion, we offer another appeal for better water-supplies—pure fountains, the streams from which shall refresh, strengthen, and cheer mankind everywhere. At present the interests of all demand that we carefully inquire into the nature and purity of the water at hand, and science and experience add that all suspicious water used for drinking and in the preparation of food should be both boiled and filtered.

MAY TEA BE PROFITABLY GROWN IN THE SOUTHERN STATES?

By Charles U. Shepard,
PINEHURST, S. C.

It is not a question whether individual plants may not be successfully grown so as to present interesting and beautiful objects in landscape or other gardening, nor whether small patches of the hardier varieties of tea may not produce sufficient leaf to supply the limited demands of a household, or even those of a country neighborhood. Those problems have been satisfactorily answered long ago in several of the Southern States. The price of labor and the yield per plant are not important factors under the latter conditions. Several large profits have been reaped on the imported commodity before it is sold over the village counter; and no account of the value of the labor expended in raising and preparing the domestic article is apt to be taken.

But the problem to whose solution much time and attention have been expended at Pinehurst, viz.: the economical raising of tea on a comparatively large scale, is confronted by several serious obstacles, and much more than the past few years must be devoted to experimental work before a satisfactory solution may be obtained.

First and foremost is the difference in the price of labor between the tea-producing countries of the Orient and the Southern States of America. It costs almost as much to pick, with us, of fresh leaf sufficient to make a pound of tea as it does to raise, pick, and pack the same quantity of by far the larger part of the teas sent to us from Asia. There are, therefore, two alternatives presented to the would-be American tea-grower: he must raise the quality of his product above that of the cheaper Oriental grades, or he must reduce the cost of production below that attained by us. The former course has been steadily maintained at Pinehurst, and with promising results.

The establishment of a productive tea-garden involves very considerable expense. A well-appointed garden, of good quality and of large leaf production, with few vacancies and of vigorous growth, a sufficient body of reliable laborers, and a suitably equipped factory, cost a great deal of money and attention. That these conditions are essential in the production of good tea must readily appear on a little reflection. *A well-appointed tea-garden* implies favorable conditions of soil and exposure to the sun, with protection from wintry blasts and the avoidance of stagnant water about the roots of the plants. *Good quality* means that the plants have been raised from the best seed attainable or capable of being grown in the local climate. It is certainly necessary to distinguish at least three sorts of tea-plants. The Assam unquestionably leads. It derives its name from that northeastern province of British India, which was wrested from Burmah early in this century. It was found growing to the height of thirty feet in the dark, steaming jungles along the banks of the Brahmapootra River, where the atmosphere was always damp and frost unknown. Its leaves are bright green and large, often attaining a length of seven or more inches, and broad in proportion. Few regions elsewhere appear to be favorable to the growth of this variety, although long ago the forests of those jungles have given place to well-ordered tea-gardens where the indigenous plants bask in full sunshine—a requisite for the remunerative production of tea crops. The attempt is being made at Pinehurst to cultivate some of this variety; but the severe weather (15° F.) to which this section of South Carolina is liable makes success less than probable. It may be that fully hardened and woody plants are capable of enduring such extreme cold, and that, by grafting or otherwise, a slightly lower type may be obtained for successful use. At the other extreme is the Chinese variety. Not that all or even the greater part of Chinese tea-plants should fall under this category, for unquestionably very many deserve far better treatment; but as the type exists to a considerable extent in China, and especially in its colder provinces, the name may be retained. This variety is a low, bushy shrub, slow of growth, adapting itself to a great range of climate, and capable of withstanding frost, snow, and ice. The leaves are of a dark green color, tough and small, *i.e.*, from two to three inches in length and quite narrow (lancet shaped). This stunted and generally unprofitable description of tea-plant is supposed to be the result of the exposure of the better varieties for centuries to dry and cold climates, and to a lack of proper cultivation.

Intermediate between the Assam and Chinese types stand the so-called "Hybrids," and reproducing in their countless varieties the characteristics of both of their parent sorts. Strictly only few of them have been obtained by the direct hybridization of the before-mentioned varieties; most of them are the result of endless crosses of different kinds, as also of the effect of climate and cultivation. It has been observed at Pinehurst how few tea-plants are not susceptible of great improvement in form, productiveness, and quality by liberal cultivation, and that gardens of widely different origins exhibit, under the same treatment, a tendency to produce a local type of leaf, with marked and distinctive characteristics.

It is generally held, especially by English authorities, that those hybrids which stand nearest, by origin and in their nature, to the Assam, are to be more highly prized. There are substantial reasons for our advice to plant only the best seed that can be grown in each locality. The Assam plants produce in their own climate about twenty *flushes* a year, whereas the average number of pickings in China do not exceed more than three or four. And it may be well to here explain what is meant by a "flush." The work of the tea-planter is to produce from the seedling, and as rapidly as possible, a vigorous bush of from two to five feet in height, according to the variety of seed. He then proceeds to deplete the plant of by far the greater part of its foliage, which is usually done in the cold season. Nature makes a prodigious effort to restore the natural equilibrium between roots and foliage, and with the advent of warmer weather throws out from every branch a vast number of tender shoots and leaves. The planter immediately plucks off as much of this young foliage as his experience has taught him to be wise, *i.e.*, without injury to the vitality of the plant or loss to the subsequent pickings. For the struggle between him and the plant goes forward through the entire season. These successive crops of young leaf are termed "flushes." The wise planter will not strip the plant of young foliage at any picking, and thus there is a steady gain in the size of the tea-plant during the growing season. With the return of cold weather a more moderate pruning is resorted to, severe pruning being enforced only every three or four years. The length of years that a tea-plant can endure this struggle is uncertain, but it should, under favorable circumstances, produce at least ten good yearly crops.

Large leaf goes further than small leaf (both being tender, for that is an indispensable condition for making good tea). The young plants, whether grown from seed *in situ* or transplanted seedlings from the nursery, should fill out the gardens at regular intervals, determined chiefly by their expected growth, varying from three by four to six by six feet where ploughing is used. Vacancies occur from the death of individual plants; they should be as few as possible, as they waste the land and increase the labor of cultivation and gathering. A vigorous growth depends upon the productiveness of the variety of the plants used, on the climate, the richness of the soil, and the cultivation. As regards temperature, the best climate for tea is a warm one, ranging during the year from 45° to 90° F., and without sudden and great variations or severe wind storms. The rain-fall should be abundant and evenly distributed throughout the year. But it is essential that frequent fogs and copious rains should occur during the warm season when the flushes are produced. The rain-fall in the countries best adapted for raising tea ranges from 75 to 150 inches and more per annum. Nevertheless, it is possible to remuneratively grow tea in medium climates with lower averages of both heat and rain-fall. Indeed, were this not the case it would be idle to attempt the cultivation here with an average temperature of 65° F. and an annual rainfall of 56 inches. The question then probably turns on the two points already mentioned, viz.: the dearness of labor and the liability to extreme cold in the winter. The occurrence of severe cold in the winter may so weaken the vitality of the choicer sorts of tea that the crop of the following season may be reduced below the amount per acre that marks the limit of profit. An average production per acre of Indian and Ceylon gardens, in good bearing, is about 400 pounds of cured tea annually; although instances are not infrequent of 700 to 1000 and even more pounds under the most favorable conditions of cultivation and climate.

The tea-plant is an enormous feeder. If the soil does not afford abundant food, artificial enrichment must be resorted to. Liberal fertilization augments not only the quantity, but improves the quality of the leaf, as has been demonstrated experimentally at Pinehurst, especially on poor and medium lands. The picking of the leaf on a garden of twenty-five acres will keep a small force of say twenty children almost continuously busy during the season. With patience and attention, the colored children in the Southern States quickly learn to perform the task satisfactorily. In the earlier flushes, they are taught to pick only the unexpanded leaf bud at the end of the shoot (the "pekoe tip"), with perhaps the one or two next and very tender leaves. Later in the season, the number of leaves to be picked may extend to three or four. It is a pretty sight to see the gathering of the leaf by the children.

A suitably equipped factory is indispensable to even a moderate-sized garden. For the present, only black teas are made at Pinehurst, and, consequently, a brief description of what is requisite for their manufacture must suffice. The first step is the withering of the fresh leaf. This is effected by thinly spreading out the leaf on floors or trays, so that every pound shall cover about ten square feet. As each pound of finished tea represents four and one-fifth pounds of fresh leaf, it will be seen that an output of one hundred pounds of dry tea per diem requires about four thousand square feet of withering surface—in itself an expensive item. The purpose of withering is to render the fresh leaf susceptible of being rolled without breaking. As it comes to the factory it is crisp and elastic; it crackles when compressed in the hand; when bent it immediately resumes its former shape. Withering requires a light, airy room, but it is better to exclude direct sunlight. A few hours sometimes suffice for the change, but usually a whole day's exposure is necessary. When sufficiently withered the leaf has lost its elasticity and feels like an old kid glove; no longer will it crackle when compressed, nor will it regain its shape. Fresh leaf has neither distinctive taste nor odor. Withered leaf has a faint odor; peculiar, but not suggestive of the finished tea. By rolling (either by hand or machinery), the oily cells in the leaf are broken up and the juice expressed upon the surface of the leaf. There it becomes foamy from the action of the air and the continued rolling. An oxidation begins, which is prolonged by exposure to the air. By rolling and oxidation (formerly and erroneously termed fermentation) are developed the strength and, in part, the flavor of the tea. The rest of the flavor and the fragrance are the result of the final process of "firing" or drying. It has been found advantageous to substitute machinery for hand power in most of these operations, especially where the production is sufficient to warrant the expense of buying and erecting the specially devised machines. And aside from economy in production, the greater uniformity of product and the more attainable cleanliness of the manufacture are commendable features. In the rolling of tea-leaf a capable man can handle thirty pounds a day; a "Little Giant" rolling machine can do as much in half an hour, and takes the labor of one mule to accomplish it. The total cost of a factory suitable for the daily production of fifty pounds dried tea may be estimated at $1500 to $2000.

It has been thought advisable to dwell on the expensiveness of tea production, as letters are constantly received asking for such information. There should be added the loss which follows from the impairment of seed on the long journey from the East, whereby only one box in four comes to hand in good order, as also the remuneration of the skill and attention which must patiently and constantly oversee every step in the growth and manufacture of the product. And thus, even if the raising and manufacture of tea in the United States be divested of all fancy, and the utmost economy be practised, it will be seen that the obstacles and expenses to be overcome are very considerable; indeed so considerable that any serious competition with Asiatic producers on the lower and medium grades is simply out of the question. What, then, are the grounds which justify the continuance of experimentation in this direction? And the only satisfactory answer that can be given is that thus far experience appears to justify the original hope of our ability to grow high-grade teas remuneratively. Thus far, we have established at Pinehurst very fair tea-gardens from choice imported Chinese and Japanese seed. From them we have produced both the green and black teas, of a quality which readily commands one dollar or more in the retail market. The gardens have few vacancies, and the plants have a luxuriant growth. There are also a number of gardens raised from hybrids that were introduced many years ago into this country by the national government. Unfortunately they exhibit the effect of neglect in having largely relapsed toward the Chinese type. They require rigorous pruning, often the extirpation of refractory individuals, the promotion of a more favorable second growth, and liberal cultivation; under these conditions they give excellent results. Other gardens of Formosa, Assam, and the best hybrids from India and Ceylon are yet too young to afford reliable data. There can be no question of the luxuriant growth of the hardier sorts, nor that the quality of the product and its reception by the public entirely meet with our fullest anticipations. But not enough experience has been gained to form an estimate of the productiveness per acre (or per plant) of the gardens; nor can any positive statement be given as to the success of the two lines of our experimentation to improve the general quality of the plants, by importing different varieties of the more tender sorts, until the variety be found which combines the utmost quality with the ability to stand this climate, or by direct propagation by cuttings and grafting to reproduce the best individual plants in the already established gardens. It was to be expected that our experiments must encounter many obstacles and cause many disappointments. But there has been success enough thus far to warrant their continuance. Ultimately it is hoped to attempt the manufacture of those very highly esteemed and priced teas which are rarely met with outside the countries where they are grown; and simply, because of a light "firing," they do not stand distant transportation. They should be drank shortly after manufacture. This is a field wherein the American grower need fear no competition from the Orient. Such teas must demand a high, *a very high price*, but if better than can otherwise be obtained, there will be no scarcity of buyers.

FOOD AND MENTALITY.

By Louise E. Francis.

Far, far away in the land of the lotus blossom, by the banks of the witching river Nile, half covered by drifting sands from old Sahara's dusty plain, rests the weird, grotesque Sphinx, the ferocious deity before whose shrine in the ancient of days poet and peasant, king and philosopher alike bowed the knee of homage. Man was yet in the childhood state of credulity and simple trusting faith, and the oracles of the Sphinx had greater weight with the wise men of the East and the philosophers of the North than the commands of an Alexander the Great or Cleopatra the fair. All knowledge and all philosophy were believed to be wrapped up in the messages sounded forth by this ferocious deity; but man is growing older now and putting away childish things, and the Sphinx of the Egyptian plain is losing its power. The sands of the desert, seemingly in sympathy with the slight paid their once fondly cherished deity, are gradually covering it with their grave-clothes from Sahara's arid plain, so that it is only a question of time till they will have completely buried this silent monument to man's credulity of a bygone age. But from the ashes of the old the new is ever springing, and to-day we have a Sphinx not made of "brick and straw" but modelled in the fertile brain of Sylvester Graham and chiselled and wrought into perfection by the progressive, investigating, vegetarian reformer of the nineteenth century.

Our Sphinx, like the one of old, has its oracles with which it confronts scientist and philosopher, king and peasant, and compels all to bow the knee in the acknowledgment of truth. Passing by its shrine to-day to learn its oracles and bring a message fresh to you, we dropped a penny in the slot and out it came both quick and sharp, "Tell me what you eat and I will tell you what you are." This edict was the inspiration of our thought, and gave rise to the consideration of the relation of food to mentality. As the Sphinx of old allowed no one to question the truthfulness of her declarations, so the modern Sphinx, in her teachings of the relations of food to mind and character, admits of no questionings of her authority, but commands us to study, learn, and obey. The declaration of this modern Sphinx is that "*the substance from which the life draws its sustenance will affect the character of the life.*" Strange as this may seem, this truth is indelibly written on every page of nature.

A primrose on the river's brim or on the prairie plain, a simple primrose is to the Thomas Gradgrinds of the world, but the student notes marked differences between the two—one has a deeper, richer hue and emits a far sweeter perfume than the other. The fragrant sweet violets of California bloom from early January until late December, and emit a perfume "sweet as the airs from Araby the blest," while here in the East they have the form and general appearance of those in the Golden State, but the combined fragrance of a hundred does not equal the sweet perfume of one of those from the mossy beds of the sun-kissed land in the far West. This vast difference is largely due to a difference in the soil from which the life draws its sustenance. The same truth applies to the entire vegetable kingdom, the peculiarities of the species is greatly modified in every particular by the soil from which it draws its sustenance.

When we rise to the consideration of the animal kingdom the declaration of the Sphinx becomes more strikingly apparent. Throughout the entire animal kingdom animals that feed upon like food are strikingly similar in character and in those instincts and propensities that give rise to cruelty, severity, and the destructive tendencies. Birds and animals that subsist largely on the flesh of others, while they differ materially in many of their instincts and the amount of intelligence manifested, are substantially alike in aggressiveness, severity, cruelty, treachery, secretiveness, and viciousness; while those that subsist upon fruits and herbs or cereals vary quite as much in the peculiarities of their instincts and the intelligence manifested, but are substantially alike in their caution, timidity, and sagacity, and the tendency to protect life by fleeing from the assailant.

Even among the domestic animals the disposition and characteristics may be substantially changed in a few generations by a change of food. The cowardly cur that scuds around the dark alleys, and starts at his own shadow, if taken up and fed exclusively upon meats, soon becomes savage and quarrelsome; if this be continued for a few generations the descendants become blood-thirsty, cruel, and vicious, directly the opposite of their cowardly progenitor. The dove, the emblem of purity and love, when fed upon meats exclusively soon changes in disposition and becomes carnivorous. In a few generations not only the disposition but the anatomy will have completely changed, the brain becomes broader and the digestive apparatus becomes like that of the sea-gull or other birds of prey, and instead of cooing and loving it dons the war-paint and is for war rather than peace, would rather fight than love or be loved. *The change thus wrought by the change in diet is not one of intelligence or higher instincts in either dove or dog, but a change in the amount of severity, cruelty, courage, and viciousness.*

Man with his sensitive, complex nature is more susceptible to the declaration of the Sphinx than any of the lower animals, and instead of forming an exception to this law running through all vegetable and animal life, he is by far the most affected by the character of the food upon which he subsists.

The quality and character of food has ever been one of the most potential forces in the formation of national types and peculiarities of people, both among savage and civilized races. Its influence can be distinctly traced. Those tribes and nations that have subsisted most largely on animal food, whether savage or civilized, while differing substantially in intelligence, artistic and mechanical ability, affection and moral sentiment, have been substantially alike in their animal propensities and manifestations of courage, aggressiveness, cruelty, and severity. As an illustration, among savage and uncivilized races the North American Indian, who subsisted largely on animal food, had a broad, heavy brain, was strong and tireless in the chase, sly and treacherous in battle with his equals, cruel and unmerciful to those within his power, savage and revengeful towards all; while the native African has a brain on an average one inch narrower than the North American Indian and like the animal that subsists upon cereals, fruits, and nuts, caution, fear, and flight are his principal means of defence. Among the African tribes that subsist wholly upon herbs and fruits there is very little severity, cruelty, or revengefulness among themselves or toward the stranger; while the cannibal not only has a peculiar liking for the missionary but is most cruel, quarrelsome, deceitful, severe, and merciless towards his own people.

Among civilized nations the mental characteristics correspond, almost if not quite, as perfectly to their food as among savage tribes. Here again, too, the most marked influence and difference between those subsisting largely upon cereals and fruits and those that live on meats is found to be in the manifestation of those propensities that give rise to animal courage, aggressiveness, severity, and cruelty. For instance, "Beef-eating England" represents fairly well the animal courage, strength, aggressiveness, and severity arising from the excessive use of animal food, and while these tendencies have been carefully directed by intelligence, elevated by centuries of an ever-increasing civilization, and softened by the benign influence of Christianity, yet it has found sufficient manifestation to make England the most aggressive of nations, and most exacting upon her subjects; until the last quarter of a century she opened trade at the point of the bayonet, dictated terms to her subjects, and still requires much of British India to keep step to the drum-beat of her martial music.

Oatmeal-eating Scotland, living under climatic, commercial, religious, and educational influences almost identical with those of England, but subsisting more largely upon fruits and cereals, has quite as much physical strength, moral courage, firmness, and stability of character as her English cousins, with far less of severity and selfish aggressiveness. If England has produced the bravest soldier and the most sagacious warrior, Scotland has produced the largest number of intellectual minds for her population and the most faithful abiding Christians.

Germany uses a larger per cent. of coarse, woody, fibrous foods and larger quantities of liquids than any other nation. The Germans as a class correspond to their diet, have great strength of fibre, power of endurance, but are somewhat lacking in compactness and intensity. Phrenologists recognize that a German brain must be larger than the Scotch or a typical American brain to give an equal amount of mentality. The German is plodding, economical, affectionate, thoughtful, and philosophical. He is not so aggressive in warfare as his English neighbor, not so quick to open fire, but keeps up an everlasting preparation and an endless getting ready that makes lesser powers conscious that his martial spirit is omnipresent.

The French as a class use a very large proportion of concentrated food, condiments, spices, wines, etc. The physical constitution of the Frenchman is compact, wiry, fine-grained, sensitive, and quick of action. Mentally he is ambitious, spirited, high-strung, proud, brilliant, vivacious, impetuous, and impulsive. His energies and mental activities are like the spicy food that he eats, more intense than lasting, his intellect is more spicy, his military history, like his wine, more sparkling, his affections more ardent than constant.

What is true of national types and peculiarities is equally true of families and individuals. The general character and peculiarities of the individual are found to correspond in a noticeable degree to the character of the food used, but more especially is this marked in its influence over the appetites and propensities. Those families that have subsisted for generations on animal food are found to be strongly animal, living largely in the base of the brain, are aggressive and courageous, cruel, sly, passionate, quarrelsome, and severe; they may have excellent intellects, even brilliant minds, with high and pronounced moral sentiments, but are substantially selfish; while those that subsist more largely or entirely on the fruits and cereals will be equally as strong, firm, and decided with quite as good or even better intellects, with stronger moral sentiments, but far less of the carnivorous, selfish, and cruel.

The animality of animal food must and does find more or less expression in the character of man. The coarser and more filthy the animal, other things being equal, the more degrading and animalizing will be its influence, while the use of cereals, fruits, and nuts are quite as potential in giving tone and shade to the character in an opposite direction, and the more perfect and complex the cereals and fruits, the more potential will be their influence. From this brief consideration of the effects of different classes of food in the formation of national types and individual characters it will be observed that the influence of different classes of food upon man is the same as upon animals; the effect is not so much upon the degrees of intelligence, the amount of sentiment or affection, as upon the propensities that give rise to animal courage, force, anger, jealousy, slyness, and severeness. The man that subsists on animal food develops the distinctive peculiarities of the carnivorous animal, while he who subsists on grains, fruits, and nuts gradually develops the peculiarities of the herbivorous animal.

The importance of these truths as given us by the modern Sphinx in her oracles of nature, when applied to individuals or nations, can scarcely be overestimated. Here is a practical field for religionists, reformers, and philanthropists to aid individuals and the race in that upward march towards higher conditions of life and establishing an era of harmony. So intimate are the relations of the body and soul, so strong is the influence of the one over the other, that neither can reach any very high degree of perfection without the normal aid and healthy activity of the other. The world is quite as much in need of a gospel of hygiene as it is of the gospel of religion. Quite as much sin is committed because of irritated nerves, overloaded stomachs, sluggish livers, and animalized brains, as from moral depravity. What the world needs most to-day is a gospel of hygiene that will enable it to live normally, be healthy, and do as well as it knows. While the race subsists so largely on animal food, spices, and condiments, unwarranted aggressiveness, selfishness, intensity, and irritability will characterize the masses. When cereals, fruits, and nuts become the food of the race, there will be a gradual decline in the manifestation of propensity, less expression of animality and selfishness, a gathering up, as it were, of the folds of the dark clouds of selfishness, revenge, and hate that have thus far darkened and cursed the race, and a rushing in of the white light of intelligence, purity, and morality.

There may be those who are so deficient in aggressiveness, courage, and selfishness that they are incapable of taking care of themselves in their age and generation, and are therefore the easy prey of their more sagacious and selfish neighbors. If such a person should be found the logical conclusion would be that he should develop a greater amount of the carnivorous in his nature by subsisting largely on animal foods, or meekly consent to be a martyr to a cause in behalf of a higher civilization, and for the time submit to the cruelty of the animality in man, that he might teach him by his patience and meekness tne higher law, the law of love.

In the application of this thought to nations it becomes of far greater significance by a change in the character of the food. In a few generations the entire character and policy of a nation could be changed. If applied to the entire world, national cruelty, war, and bloodshed would gradually become a thing of the past; the spirit of justice, arbitration, and brotherly love would adjust all national differences, disband the standing armies, convert our war-vessels into ships of commerce, stack our great guns in museums of antiquity, and out of those round death-messengers of shot and shell erect a pyramid over the graves of the selfish past. If, however, war and bloodshed are to be the rule, if all differences are to be settled at the point of the bayonet, or the mouth of the cannon, let us continue to slay the bullock and gnaw the fibre from his bones, and subsist upon his flesh that the mind may be filled with courage, hatred, malice, and revenge, so that the enemy may fall before the sword, and the sceptre of cruelty become the final tribunal of nations; but if intelligence, morality, charity towards all and malice towards none are to become the ruling spirit in the world, if the dream of the millennium is ever to be realized, if her gray dawn is ever to light up the eastern horizon with its golden beams of glory and send forth the angel of peace to spread her white wings of love over the nations of the earth, the use of animal food must be gradually done away with until it becomes a thing of the past.

When this time comes, for come it must and will, the people enjoying that higher state of civilization, that more glorious liberty, living in those more lofty altitudes, will look back into the benighted past and through the telescope of history will see the pioneer vegetarian lighting the lamps of truth along the way notwithstanding the sneers and jeers of the masses, and becoming conscious that the liberties and the glorious privileges that they enjoy have been made possible by the efforts of the pioneers, they will rear a monument of respect to the early vegetarian societies and place on its apex the crowned queen of love, who shall ever rule over the animality of man and give peace and prosperity to the world.—*Health Culture.*

WHAT IS MAN'S NATURAL FOOD?

By Charles E. Page, M.D.,

BOSTON.

A few years ago the writer contributed an article on the topic of natural diet to one of our leading medical journals, taking the ground that nuts and fruits were not only the original diet of human beings, but that they are to-day by all means the most wholesome and nutritious of all foods. Nuts of all kinds, the fresh juicy fruits, as oranges, peaches, apples, etc., the date, fig, grape (raisins), etc.—all these are relished by mankind, world over, and supply every element required for perfect nourishment; and, generally speaking, all these foods that are absolutely essential to life and health are obtainable by the greater proportion of the people. Impecunious persons cannot indulge in strawberries at a dollar a box, peaches at five dollars the basket, or other fancy varieties at fancy prices, to be sure; but assuredly all persons who can pay fifteen to twenty cents a pound for beef, as we know is true of no end of wretchedly poor people in the mistaken notion that a large share of animal food is essential to health—or, perhaps, in the idea that they must imitate the diet of the rich—can pay as much per pound for English walnuts, or other varieties of nut-food; and many would be inclined to do this if they were fortunate enough to know that nut-food is far more nutritious and a better balanced diet than flesh-food at any price.

That wonderfully muscular animal, the squirrel, that carries himself with such rapidity, almost like lightning, to the top of the tallest tree—does he not build his muscle from nuts? In winter this is his chief food, and in spring he lives on the fresh buds and green things, comparable to our fresh fruits, early vegetables, lettuce, etc. Almost every one is fond of nuts of all kinds, and we know that nuts and raisins are served as the last course of swell dinners, probably because they are so delicious that they tempt the appetite even after the diners are fed to repletion. And this fully accounts for their alleged indigestibility; they are usually eaten after an excess of food has already been taken; or they are taken in excess because so delicious that "one doesn't know when to stop"! Under like conditions breast milk, unquestionably the natural diet of the nursling, proves "indigestible"! Too much of a good thing is bad.

In acknowledging the receipt of a reprint of the article mentioned above Prof. Edward Atkinson, the eminent student of household economics, writes: "You may be interested to learn that Sir Isaac Holden, probably or almost certainly the inventor of the lucifer match and absolutely the inventor of the largest and most successful wool-combing machine, now very rich and nearly the Nestor of Parliament (about 86), believes that nuts and fruits are the natural food, and that by limiting his diet mainly thereto he may expect to extend duration of life to one hundred and twenty-five. His place in Yorkshire is a very interesting one, especially his acres of glazed fruit gardens on the ridges of Yorkshire."

The natural diet question is at the present time attracting a great deal of attention, and throughout Europe, England, and even here in America, the propaganda of "the natural diet" has within the past few years acquired quite an impetus through the intelligent efforts of the Drs. Densmore, of London and New York. Rich enough to enable them to do so, they have established a health journal, *Natural Food*, publishing it monthly at a cheap rate, in London. The evidence of the benefits arising from this natural diet furnished in the columns of the modest little journal referred to would be quite surprising to any one not already a convert to the theory that the nuts and fruits are the best foods for nourishing the body in health, and best calculated to aid in the cure of many forms of chronic disease.

The nut is so "hearty," contains such an amount of solid material, that a novice might easily take an excess of nutriment, unless admonished as to amount. I once delighted the heart of a lady patient by prescribing nuts as a part of her diet, cautioning her against taking an excess. Doubtless forgetting my advice as to quantity she bought a pound of English walnuts and ate most of them at one meal. Naturally enough she reported the next week that she was "sick of walnuts" and couldn't eat them any more! A few ounces of nutmeat, with a large proportion of one of the sweet fruits, as dates or raisins, make a full dinner. A hearty lunch may be made from, say, two or three dozen dates with a sip of milk with each, making a "sweet pudding" that no *chef* on earth can equal for wholesomeness or excel for toothsomeness.

ALCOHOL IN THE TREATMENT OF DISEASE.

The Southwestern Medical and Surgical Reporter, in a very interesting editorial, has this to say on the above subject:

"The time was when alcohol was believed by the majority of the medical profession to be the ideal stimulant in typhoid fever, pneumonia—particularly in the later stages—and in fact all cases of anæmia or collapse or shock, or in any and all conditions of the system in which the vital powers were by any means brought below par.

"Men in the front rank in the profession held out, and a few are still holding out, that alcohol augmented the heart-force, and by that means increased arterial tension, and if given when for any reason the heart was unable to properly fill the arteries, and especially those at a distance from the heart, the heart's energy would be revived and the results would be beneficial; and this all in the face of what physiologists had taught many years ago—that alcohol was rather a depressant of the vital powers than a stimulant.

"When we know the immediate effects of a large dose of alcohol upon the coats of the stomach, and when we stop to reflect that one of the most apparent effects of alcohol upon the system at large is a benumbing of the sensibilities, how can we doubt its depressing influence?

"Real stimulants do not act in this way, but their effect is to increase the tonicity of the nerve-supply throughout the system, by stimulating the heart and causing it to beat with more energy, thereby increasing sensibility and giving vigor to all the functions of the body.

"The consensus of opinion is now, we believe, that alcohol holds a very limited place in medical therapeutics, and should rarely be used — surely never as a stimulant."

THE DIGESTION OF STARCH IN THE STOMACH.

If to a solution of starch we add a dilute acid and keep the mixture at a high temperature, the starch becomes changed into dextrin and glucose. Are the conditions under which starch is subjected in the stomach favorable to conversion in this manner?

A priori one would not expect that starch could undergo any conversion in the stomach, as the degree of acidity is so feeble and the temperature comparatively low.

From experiments on Alexis St. Martin, however, Smith concluded that starchy food was digested in the stomach independently of saliva, and Brown-Séquard, from his own experience, came to a similar conclusion. Munk and Haycraft have even described a ferment which is sometimes found in the gastric mucous membrane of the pig, and which changes starch into sugar. Brucke found that soluble starch was formed in the stomach to a large extent, and thinks that it is due to the acidity, while the erythrodextrin formed from starch is due to the lactic acid fermentation. The saliva of dogs has only a very slight diastatic action, yet when fed on starch, dextrin and sugar are found in the stomach along with free hydrochloric acid.

On the other hand, Dalton, Kuhne, Duclaux, and Schiff deny that starchy matters are digested in the stomach. Foster states that the gastric juice *per se* has no effect on starch whatever. Bouchardat and Sandras found that starch underwent no change in the stomach of rodents. It was only in the small intestines of these animals that dextrin and glucose were formed from starch. In birds they found that starch was much more completely digested, and so in the gizzard dextrin and glucose were found. They think, however, that in the human stomach cooked starch begins to be dissolved. Laborde found that gastric juice had not the same power of converting starch as a solution of hydrochloric acid of the same degree of acidity, and thinks that the acid in the stomach was therefore lactic acid.

If the reaction of the gastric contents be neutral or alkaline, achroödextrin may be formed through the continued action of the saliva. If acid, however (and this only to a small extent), then the conversion which has begun is rapidly brought to a conclusion, and so erythrodextrin may be alone formed.

Von den Velden states that ptyalin acts in the stomach only in presence of weak organic acids, but not if free hydrochloric acid be present also. It has been found, however, that when starchy food is received into the stomach the secretion of hydrochloric acid takes place very early and in a not inconsiderable amount, and remains so till the food passes out of the stomach.—*Charlotte Med. Journ.*

Department of Physiologcal Chemistry.

WITH SPECIAL REFERENCE TO DIETETICS AND NUTRITION IN GENERAL.

THE USE OF DRUGS.*

BY W. R. GOWERS, M.D. LOND., F.R.S.

THE physician's experience of the use of drugs is acquired under conditions not altogether favorable. It is his task to deal with cases that have resisted the efforts of practitioners who are often wise, persevering and equipped with knowledge in a degree increasingly adequate and effective. Success in treatment by drugs after such antecedent efforts seems to me to testify to the undeveloped capacities in the means employed. However this may be, I am convinced that the method of treatment to which the average practitioner is chiefly restricted now, as he was in the past, to which he is limited by a compulsion not less at the present time than in former days, has not only a power that can be realized now, but also a potentiality yet to be developed.

It has therefore been with great interest that I have seemed of late to see more clearly why this should be. When I say "I have seemed to see it," I do not mean that it is not conspicuous to many. The scepticism regarding the use of drugs to which I have referred is, I think, less now than a few years ago. One favorite foothold was the statistical demonstration of inutility—as, for instance, that the average duration of acute rheumatism was the same whatever treatment was employed or when no agents were used. That is no longer possible, since we have sought help from the willow which casts its shadow on the damp places in which there thrive the bane and antidote. Since the salicylates were employed I fancy the significance of the loss of this convenient argument has been felt. Then, moreover, the empirical advice, "Try all things; hold fast that which is good," to which in the hands of peasants we owe many of our most precious aids, has been applied to the results of modern chemistry, and every tangible achievement of science has been seized by the "advanced pharmacy" of the present day.

THE POTENCY OF DRUGS.

But can we discern the reason why drugs are useful? Consider. I show you two tubes. Each contains a small quantity of a white powder—about half a teaspoonful. Each consists of the same elements. One is practically harmless; the other contains within it the power of death to 1000 men. The one is quinine; the other is aconitine—the alkaloid which makes so deadly the plant whose flower our ancestors called "monkshood" in the far-off days when the original was always before their eyes. It is an almost startling fact that in this minute quantity of powder, hardly visible to those at a distance, there is such a potentiality of death. Picture to yourselves 1000 men. That which is in this tube would end the life of every one of them. There is a latent power within this powder beside which the lightning flash is feeble, and to which the earthquake might give place, so far as the comparison depends on lethal certainty. But the resemblance in the aspect of these two substances is not all. As I said, each consists of the same elements; each is made up of carbon, nitrogen, oxygen, and hydrogen. Each consists of the elements which compose air and water, with some carbon added—soot, if you like. Why is one almost harmless, and the other a most deadly poison? I might have chosen for the lower term of the comparison a simple food, but then the amount of nitrogen would have been less and resemblance in construction less close. The answer may be given, "It depends upon the chemical constitution." True, but this takes us a very little way. When we discern that the difference depends upon the way in which the atoms of the elements are arranged in molecules, and the molecules are grouped together, we are no nearer an explanation. We see a little more, however, when we realize that chemical constitution means that energy is held "latent" (as it is said) ready to be released when the elements can form simpler, closer compounds, and that on the same kind of constitution and the same kind of simpler union, and similar release of energy, in the constituents of the living tissues seems to depend all vital function. As far as we can see, all the energy which is released in the animal body is released in consequence of chemical union under the mysterious influence of life. When such union and such release are going on, the process may be changed entirely by the contact of molecules of allied constitution, with latent energy on the point of release, so held as to blend with that which is being set free as living tissue. Blending with this, it may augment or oppose it. Remember that a difference in chemical constitution means a difference in the readiness with which the elements separate and reunite, and on this depends the effect exerted by the energy they bear. I have recently endeavored to explain this in a small book,* in which you can, if you desire, pursue these conceptions.

---

* Extract from an address delivered before the Harlesden Medical Society.—From the *London Lancet.*

NERVE FORCE,

as far as we can see, is the result of such chemical change occurring under the influence of life in the molecules which compose nerve tissue. Chemical compounds may come into relation with the substance in which change is occurring without exerting the slightest influence upon it. But another substance may come, even in amount inconceivably minute, whose molecules are so arranged as to fit in as it were with the changing molecules of the living tissue. The energy the new molecules bear seems to blend with that which is in process of ordered release in the living tissue, and to blend so suddenly and so effectively as to derange it entirely. The various nerve tissues which compose the centres seem to us the same, but they must differ in their precise chemical nature and in the precise chemical action which their life-work involves. This fact is revealed to us only by their different response to different chemical agents, but the revelation is often a startling one. The difference in response is certain, the uniformity in the nature of the agent is certain, and therefore the difference in result must be due to a difference in that on which the agent acts. Although we have no other evidence of this, consider the absolute significance of such facts as that atropine acts first upon the nerve substance of the eye and strychnine upon that of the spinal cord.

THE ACTION OF ACONITINE.

Such an influence as I have spoken of seems to be almost universal in the case of aconitine. Its contact with any acting nerve structure seems to be, as it were, so direct, instant, and precise as to generate as it were an avalanche of energy, sweeping all before it, or opposing the process of liberation of energy with a momentum that involves a sudden stillness among the whirling atoms whose throb is far below the range of human sense. Among the nerves thus influenced may be those on which depends the action of the heart, and with a sudden spasm or a sudden stillness the heart stops and life is ended. That which so acts we call a poison. Widely different from this as is that vehicle for energy which we call a food, the difference is one of degree. Every form of food is such by taking to the tissues new energy in fresh molecules. Between the two—the poison and the food—there is an almost infinite gradation of substances whose influence is exerted in like way by chemical compounds upon the chemical processes of life, upon the state of nutrition and upon the mode of action of the living tissues. It is in this intermediate region that there is the range of therapeutic influence conveyed by the vehicles we call drugs. The difference is of course in part one of quantity. But it is by the relation of the latent energy of the agent to the energy being released in the tissue, and to the secondary effect of the action thus produced upon nutrition, that one wide scope for the influence of drugs can be readily perceived. There are others, but they are different aspects of the same influence, and the facts may, I think, be best epitomized by the statement that treatment by drugs would be correctly named "dynamical therapeutics."

---

* "The Dynamics of Life." London: J. & A. Churchill, 1894.

OXIDATION IN THE SYSTEM.

Although I believe that it is generally true that what we call "matter" is only effective, whether it be employed as food, medicine, or as poison, because it is a vehicle for energy, some apparent exceptions should be at least mentioned. In the functional action of all structures in the body molecules are constantly passing off, which, having formed with oxygen lower compounds and having yielded their latent energy, are useless, and these are constantly being replaced by others formed under the influence of life from the material which the plasma has brought to the vicinity of the structure. It is possible that the molecules of some poisons may enter into the constitution of the tissues in abnormal amount, and thus disturb function by deranging the release of energy. There are also some cases in which atoms of some different element seem to enter and replace normal atoms, and thus derange. Whenever arsenic is brought in contact with the nerve elements, whatever be its combination, it induces not only functional but also structural changes in these, leading ultimately to their degeneration. We can only explain this by supposing that atoms of arsenic are taken up by the nerve substance in the course of the molecular renewal which attends functional action, and it is reasonable to suppose that this is due to its close relation to phosphorus, which we know is a constituent of the nerve material. It is possible that such substitution may take place in a slight degree without any injurious consequences, and even, in morbid states, with benefit. The influence on the nutritional process may be actually beneficial when this is already in some way deranged. It may promote the subsequent due assimilation of phosphorus, and make this more adequate and effective. Of course this is only a speculation. It is sometimes a help to conceive how that may be which we cannot but perceive as a fact.

These remarks have reference, of course, only to the medicinal agents which act through the blood. There is a considerable scope for thought regarding the action of agents which do not pass into the blood, which act only upon the surface, or on that portion of our real exterior which is within us, as the alimentary canal. In this region, moreover, there is some room for bringing conception to the test of experiment. Many purgatives, of course, act through the blood, but chemical processes seem to take less part in the operation of saline aperients. These act rather by "flushing out," the liquid in which the salt is dissolved, being merely added to by osmosis and exciting contraction. The subject, indeed, requires more special study than it has received. The great service of salines seems to me to be effected by removing that which would be in part reabsorbed.

EMPIRICISM AND RATIONALISM.

One other phase of modern therapeutical thought is to me a mystery. It is the contrast which is often drawn between the empirical and the rational in the use of drugs, and the disparagement of the former in comparison with the latter. Possibly it is a result of the influence of the scientific training which now dominates medical education. Beneficial as this training is, its influence may acquire a momentum that carries the effect too far, and, indeed, its influence may spread too widely for the good of those whose lives are to be devoted to the hard and often routine work of applying knowledge. The intense love for pure science begotten in the better class of medical students of the present day, warm with the ardor of youth, makes them slow to sink into the grooves to which they are predestined, and hinders their perception of that which they might gain and see therein. They yield at once to the distinction between the rational in therapeutics and the merely empirical. It is all very well to esteem the rational, but we have, I hope, seen that this esteem should not be allowed to cause an aversion from that which is precious, and yet cannot be called "rational" in the common, narrow sense of the word. The antithesis of the empirical and the rational is itself an error. It is an instance of a common tendency to put a positive conception into a negative word. Because the empirical is not the rational, it is conceived as irrational—the only simple negative we have, but one that implies far more than simple absence of the quality excluded. The "irrational" should be merely the "not rational," but in effect it carries us as far beyond neutrality as does "unreasonable." No one means by "unreasonable" a simple absence of the quality of reasonableness. We are so accustomed to the use of the mere negative for the opposite positive that an effort may be necessary to perceive the real meaning of the words. Not only is the empirical not positively irrational, it is doubtful how we are justified in considering that a truly rational element is absent from the empirical. The term "rational therapeutics" is applied to treatment in which a drug is given with success in accordance with preconceived ideas or with a theory. The theory may turn out quite wrong, although the result is the same. What, then, becomes of the rationality? In empirical therapeutics a drug is given because it is found by experience that in the particular condition it does good. Often we cannot even guess why.

THE THEORY OF MEDICINAL TREATMENT.

But the fact remains, and surely to act upon observed experience is as truly a rational proceeding as is action upon a theory which may be incorrect. After all, the medicinal treatment which can be based upon any definite theory is small. How seldom moreover, can we use a drug to advantage which was discovered save by the purest empiricism. In not one drug in twenty, perhaps not one in fifty, of those of most certain service, can the use be traced to anything except unguided experiment. Our knowledge of these drugs, derived from the past—and often from the distant past—must be assumed to be the result of experiments innumerable, perhaps continued through the long tens of centuries in which the human race has lived among surroundings which alike compelled and suggested endeavors to counteract disease by every available means. The need for food must itself have led men to a knowledge of the physiological action of most herbs of the field, especially when domestication brought the habits of animals under observation, habits such as must have had the power of example. It is probable that since man became able to observe and to reason, every common herb of the field and fruit of the tree has been at some time tested, and thus by slow degrees the knowledge of a physical good and evil has been acquired.

OUR DEBT TO THE HERBALISTS.

It is strange, indeed, to note how far back goes the use of the drugs on which we most rely. Most of them can be traced into the mists of the popular knowledge which is so easy to sneer at and would be so difficult to do without, or until they are lost in the bluer mists in which the distance shrouds alike the hills of Greece and deserts of Arabia, or to the time when the world learned its wisdom from the land where now only the sculptured symbols of man's thought stand silent in the cold moonlight of a long dead past. We smile at the popular herbal remedies. But it is to these that we owe the majority of our most useful drugs. I cannot conceive a therapeutist surveying a list of the chief drugs on which we depend in our daily work—and do not depend in vain—without a sense of wonder and perhaps of humiliation. We disinfect our rooms with burning sulphur; and so men did before the time of Homer. We purge sometimes with rhubarb, especially when some subsequent astringent influence is desirable, and so did the old Arabians for the same special reason. The value of castor-oil in its chief use was familiar, probably for ages, to the natives of the East and of the West Indies before it was made known in Europe by a physician from Antigua 150 years ago. Aloes was employed in the same way long before the time of Dioscorides and Pliny. The knowledge of the influence of ergot in parturition we owe to the peasants of Germany, and the use of male fern for tapeworm goes back to the old Greeks and Romans. The employment of mercury in syphilis by inunction and fumigation, which our nineteenth-century therapeutists regard with such satisfaction, seems to go back to the time of the crusades, and it is said that its use can be traced in Malabar as far back as the ninth century. Podophyllin as a purgative we owe to the North American Indians. If we go through all the drugs on which we most rely, we find the same story. Even in the case of those which are the latest additions to our resources, we find that, with very few exceptions, their use arose from what we must regard as pure empiricism. It was by accident that the local anæsthetic influence of cocaine was discovered. The unexpected results of simple experiments afforded us the chief use of antipyrine; and that which is perhaps the greatest practical discovery of modern times in the influence of drugs on disease—the use of bromides in epilepsy—was the result of a chance observation of its use on an allied state—also empirical. To this day we are without any rational perception of its mode of action or of the reasons for its use in given cases. I yield to no one in my sense of the importance of the rational in therapeucits; but we need to be careful lest, in contrasting the rational and the empirical, we allow our esteem for the one to induce a depreciation of the other. We can afford to despise no source or kind of help, or to permit our estimate to be lessened by the many warping influences to which our thought is liable.

I have, indeed, tried to frame a definition of rational therapeutics which I could illustrate by examples. I will not say that I have wholly failed, but my success is not sufficient to let me submit it for your consideration. But the attempt has impressed me with a doubt as to the propriety of considering that a theory, to explain an empirical discovery, makes the therapeutics rational. It is very easy to frame a theory of the action of a drug, and it is easy to extend this theory to the nature of the disease in which the drug does good, and at the same time to ignore the many other possible ways in which the effect may be produced, and so to build from a small and uncertain foundation an edifice which some new knowledge may reduce to that which most builders call “ rubbish.”

THE PEOPLE'S FOOD — A GREAT NATIONAL INQUIRY.*

It is indicative of the advance of scientific research that, in a New England college—a college for culture as distinguished from the scientific school — two scientific enterprises have had their beginning and have within twenty years come to receive the support of both State and national governments and grown to national importance. It is also significant of the increasing influence of our higher educational institutions that, while these enterprises have required as the foundation of their success the scholarly spirit and profound inquiry which belong to the higher university life, they also take hold upon the most practical interests of the daily life of the people. The institution is Wesleyan University at Middletown in Connecticut. The enterprises are: 1, the Agricultural Experiment Stations, and 2, the Investigation of the Laws of Nutrition and the Economy of the Food of Man. The pioneer in their promotion is Dr. W. O. Atwater, Professor of Chemistry in the Wesleyan. The food investigations as they are now being carried on are closely connected with the experiment stations, and a description of the one calls for reference to the other.

---

* An abstract from the *Review of Reviews.*

THE AGRICULTURAL EXPERIMENT STATIONS.

Nearly forty-five years ago a company of farmers joined themselves together in the little German village of Moeckern, near the city of Leipsic, and under the influence of the Leipsic University called a chemist to their aid and (with later help from government) organized the first agricultural experiment station. Liebig in Germany, Boussingault in France, Lawes and Gilbert in England, and other great pioneers had been blazing the path of progress for years before. A great deal of research bearing upon agriculture had been and is still being carried on in the schools and universities, but the action of these Saxon agriculturalists in 1851 marks the beginning of the experiment station proper—the organization of scientific research with the aid of government "as a necessary and permanent branch of agricultural business."

The seed thus sown has brought forth many fold. In 1856 there were five ; in 1861, fifteen ; in 1866, thirty ; and to-day there are more than one hundred experiment stations and kindred institutions in the different countries of Europe. Some are connected with the great universities or agricultural technical schools, others are independent and supported by societies. In each of them, from one to ten or more investigators are engaged in the discovery of the laws that underlie the practice of farming, and in finding how they are best applied.

So rapid and so sure has been the progress of this enterprise in both hemispheres, that private persons, educators, societies, and governments have learned the usefulness and indeed the necessity of these institutions, not for the farmer alone, but for all who are dependent upon the products of the soil. The movement is extending to Asia and to South America—everywhere, indeed, its importance is coming to be felt.

EARLY EFFORTS IN CONNECTICUT.

Naturally, thought in the United States was turned in this direction. Excellent experimental work was carried on in many places, especially by chemists. At a meeting of the Connecticut Board of Agriculture in December, 1873, Prof. W. O. Atwater, who had just come to Wesleyan from studies of chemistry in Europe, delivered an address upon the subject which was ably enforced by his former teacher, the veteran agricultural chemist, Prof. S. W. Johnson, of the Sheffield Scientific School. The farmers present, although they were not familiar with the intricacies of science, were wise enough to appreciate its usefulness. They decided then and there to make an effort toward the establishment of such an institution in Connecticut. Plans were made for meetings of farmers from different parts of the State, and a systematic campaign was instituted under the auspices of the Board of Agriculture, of which the Hon. T. S. Gold was secretary. The ground had already been prepared by previous labors of the gentlemen last mentioned and others, and at the next session of the legislature a bill was brought forward making an appropriation for an experiment station. But the idea was new, the legislature was conservative, and the appropriation was refused. The campaign was repeated the next season and a bill brought before the next legislature, but without success.

At this juncture Mr. Orange Judd, the well-known founder of the *American Agriculturist*, who was then a resident of the State, came forward and offered to give $1000 on his own part and, on the part of Wesleyan University, the use of rooms in the chemical laboratory of Judd Hall, the scientific building which he had donated to that institution, if the legislature would make a grant of $2800 a year for two years. This turned the scale, the appropriation was made, and the station was established in the autumn of 1875 with Professor Atwater as director. Two years later the question of continuing the enterprise and establishing it on a permanent basis came before the legislature. It was a time of great financial stress. Old appropriations were being cut down and new ones entirely refused. Nevertheless, such was the impression which this youthful enterprise had made in the State, that even the farmers from the small towns, who, strange to say, had been its strongest opponents at the outset, favored the enterprise most heartily, and a bill "to promote agriculture by scientific investigation and experiment," and making a permanent appropriation of $5000 per annum, passed both houses without a dissenting voice.

Other States, inspired by the example of Connecticut, and urged by able and earnest citizens, soon established stations within their borders, so that in 1887 there were some sixteen of these institutions in fourteen States. In that year Congress made the enterprise national by an appropriation of $15,000 per annum to each of the States and Territories. This has led to the establishment of new stations, or the increased development of stations previously established under State authority, until there are to-day some fifty-five agricultural experiment stations in the United States. In 1888 the office of Experiment Stations was established in connection with the Department of Agriculture in Washington as a central agency to aid in conducting the work of the stations and collating and distributing the results of their inquiries. The stations with the central office in Washington receive, in round figures, $1,000,000 per year, of which nearly $750,000 comes from the general government and the rest from State governments and other sources, including private gifts. They employ over 600 persons in the work of administration and inquiry. These include directors, chemists, botanists, horticulturists, agriculturists, veterinarians, dairymen, foremen, clerks, and the like.

WHAT THE STATIONS DO.

The stations prosecute abstruse researches in the chemical, biological, and botanical laboratory, and carry out more practical experiments in the green-house, the garden, the orchard, the farm, the stable, and the dairy. They study the laws that underlie the culture of the soil, the use of fertilizers, the growth of plants, and the nutrition of domestic animals and man. They also study the diseases of plants and animals. They endeavor to learn how the information they obtain may be best applied in practice.

The stations published, in the year 1894, some fifty-five annual reports and over 400 bulletins. The number of copies of each bulletin varied from a few hundred to 20,000 or more. One of the stations, that at Cornell University, New York, estimated that each one of its publications directly or indirectly reached more than half a million of readers. Besides these publications a very large correspondence is carried on with farmers, many hundreds of public addresses are annually made by the station officers, and the results of their work are taught to thousands of students in colleges and schools; and finally, the press, including the metropolitan and country newspapers and the magizines, are constantly discussing the fruits of experiment-station work and spreading them abroad among the people.

FOOD INVESTIGATIONS.

The message of His Excellency Governor Coffin to the session of the General Assembly of Connecticut in 1895 recommended an appropriation—which was made in due course by the legislature—for investigations of food economy. The statement accompanying the recommendation contained the following:

"The nutritive values of different foods, and their proper preparation for the use of man, is a subject of vital interest to our people. Half the earnings of the wage-workers of Connecticut—indeed more than half the incomes of the bread-winners of Christendom are spent, and must be spent, for their food, and any information that enables the laborer to select his food according to its nutritive value, and to prepare it in the most advantageous manner, must result in much saving of his hard-earned money, lightening his burdens and increasing the happiness of his home."

What Governor Coffin says of the cost of food is based upon statistics—collated by Dr. Engle, formerly of the Prussian Bureau of Statistics; Carroll D. Wright, United States Commissioner of Labor, and other eminent statisticians—which show that from 50 to 64 per cent. and more of the earnings of working-people in Massachusetts, Great Britain, and Germany are expended for food, and that the smaller the income the larger is the share that goes, and must go, for food. The cost of preparing food for the table, rent, clothing, and all other expenses must be provided from the remainder. As Edward Atkinson tersely puts it: "Half the struggle of life is a struggle for food."

The following figures are summarized from a report of the Massachusetts Bureau of Labor by the then Chief, now United States Commissioner Wright:

PERCENTAGE OF FAMILY INCOME EXPENDED FOR SUBSISTENCE.

	Annual income.	Amount expended for food.	Per cent. expended for food.
GERMANY.			
Workingmen	$225 to $300	$140 to $186	62
Intermediate class....	450 to 600	248 to 330	55
In easy circumstances	750 to $1,000	375 to 550	50
GREAT BRITAIN.			
Workingmen.	500	255	51
MASSACHUSETTS.			
Workingmen.........	350 to 400	$224 to 256	64
Do	400 to 600	284 to 378	63
Do	600 to 750	360 to 450	60
Do	750 to 1,200	420 to 672	56
Do	Above 1,200	612	51

The power of a man to work depends upon his nutrition. A well-fed horse can draw a heavy load. With less food he does less work. A well-fed man has strength of muscle and of brain, while a poorly nourished man has not. A man's nourishment is not the only factor of his producing-power, but it is an important one.

DEVELOPMENT OF THE SCIENCE OF FOOD AND NUTRITION.

The great pioneer in this field was the celebrated German chemist, Baron Liebig, whose best work was done between 1840 and 1870. He has been followed in Germany by Professors Voit and Pettenkofer, whose researches have been the most celebrated of recent years, and by a large number of other investigators who have rendered most useful service. Among other names worthy of special mention are those of Professor Moleschott in Italy, Claude Bernard and Anselme Payen in France, and Professor (now Lord) Lyon Playfair, Sir John Lawes, and Sir Henry Gilbert in England. The majority of the research of this class in Europe has had to do with the food and nutrition of domestic animals, but of late much attention is being given to the nutrition of man. The most of the European work has been done in chemical and physiological laboratories in connection with the great universities and the agricultural experiment stations. Research of this kind in the United States has been more tardy of development. Much has been done in the experiment stations during the last few years, but mostly with domestic animals.

Fifteen years ago we had almost no information about the composition and nutritive values of materials used for human food in the United States. With the exception of a comparatively few American analyses of flour, milk, and butter, the available information of this kind came to us from Europe. Between the years 1877–1882 an inquiry into the chemistry of food fishes was made by Professor Atwater at Wesleyan under the auspices of the United States Fish Commission. A little later a number of analyses of other animal foods were made in the same place at the instance of the Smithsonian Institution and for use in connection with the National Museum. Part of the expense of these investigations was borne by the government institutions referred to. The rest was paid by private persons. Later, the Storrs Experiment Station, also under the direction of Professor Atwater, carried on a series of inquiries as a part of the study of dietaries made in co-operation with the United States Department of Labor. At the World's Fair in Chicago the Bureau of Awards of the Columbian Commission undertook an inquiry into the composition of food materials there exhibited. Some 500 specimens were collected under the direction of Professor Atwater, who was a member of the Jury of Awards, and were analyzed partly at Chicago and partly in Middletown. This was the most extensive single inquiry of the sort which had been undertaken up to that time. Of late, similar inquiries have been made by a number of institutions, including especially experiment stations. A compilation of American analyses of human foods has just been made and is about to be published by the United States Department of Agriculture. It includes all of the analyses now available except those of milk and butter, which are already too numerous to be conveniently gathered together. The total number of specimens in the compilation is somewhat over 300. The results have already been summarized in tabular form in a bulletin in press. We have thus to-day a reasonably clear idea of the chemical composition and nutritive values of the food commonly in use in the United States.

STUDIES OF DIETARIES.

To understand the nutritive value of a given food material we must know not only how much nutriment it contains but how much of the different nutrients are digested. Many experiments in this direction have been made in Europe, and of late a number have been undertaken in the United States. It is likewise necessary to know something of the kinds, amounts, and composition of food materials actually eaten by people of different classes and occupations and in different regions. Inquiries of this kind were begun by Liebig, in Germany, fifty years ago. A large number have been since carried out in that country and elsewhere in Europe. Within a few years past the inquiry has extended to Japan and other Asiatic countries, and late journals bring accounts of similar inquiries in Abyssinia.

The first systematic effort in this direction in the United States was made in the year 1886, when Colonel Wright, then Commissioner of Labor in Massachusetts, undertook some inquiries into the conditions of living of working-people in that State. The statistics of the food consumption of a large number of families and boarding-houses were collected by him, and the quantities of nutritive materials were worked out by Professor Atwater on the basis of analyses made at Wesleyan University. Later, when Colonel Wright became head of the United States Department of Labor, the same work was continued by co-operation between that department and the Storrs Experiment Station, under the direction of Professor Atwater. A number of studies were also made by Miss Amelia Shapleigh, in connection with the Dutton Fellowship of the College Settlement Association. In the *Review of Reviews* for March, 1896, is an account of such a study, which was made at the University of Chicago. When, two years ago, the Department of Agriculture was authorized to conduct an investigation into the economy of the food of the people of the United States, it addressed itself to a more systematic series of investigations which have been distributed throughout different parts of the United States. Some of the results of the later work are now being published by the Department of Agriculture at Washington, and others will soon be published by that department. The real object of these investigations is twofold: to find what kind of nutriment people actually eat, and, by comparison of their actual food consumption with physiological standards, to learn how their diet might be improved.

FOOD ECONOMY IN THE SCHOOLS.

One thing which the promoters of this enterprise have much at heart is the introduction of instruction regarding the fundamentals of food economy in the schools. The idea has met the very earnest approval of a large number of our leading educators. Secretary Morton and Assistant Secretary Dabney, of the Department of Agriculture, and Director True, of the Office of Experiment Stations, are personally much interested in the matter. The department has already published several colored charts, 25 by 40 inches in size, which are being sent out to educational institutions, school superintendents and teachers, to call their attention to the subject. It is also publishing a series of popular bulletins in which elementary explanations of the subject are made.

CO-OPERATION OF SCIENTIFIC, EDUCATIONAL AND PHILANTHROPIC INSTITUTIONS.

The policy of the Department of Agriculture has been to distribute the inquiry in different parts of the country, and to have it carried out in connection with scientific and educational institutions and philanthropic organizations, each of which becomes itself a contributor. In Connecticut the work is carried on by co-operation with Wesleyan University and with the Storrs Experiment Station, which receives the State appropriation above referred to. In New York City the Association for the Improvement of the Condition of the Poor and the Industrial Christian Alliance have co-operated. The former, which is one of the oldest and most extensive of the philanthropic organizations in the United States, and includes among its directors the most substantial business men and largest-hearted and wisest philanthropists of that great city, has used its agencies and its funds for the prosecution of inquiry into the food and nutrition of the people of the congested districts among which it is working. A similar work is being done by Hull House in Chicago.

This policy of co-operation has two decided advantages. One is that a large number of institutions, representing the interests of the people in widely separated regions, unite in an effort for the common welfare. Besides the institutions just referred to in Connecticut, New York, and Chicago, the Maine State College, the New Jersey Agricultural Experiment Station, the Pennsylvania (Female) College, Purdue University, Indiana; the universities of Minnesota, North Dakota, New Mexico, Missouri, and Tennessee, and the Alabama Polytechnic Institute and the Tuskegee Institute (colored), in the same State, have already been associated with the Department of Agriculture. They are extending their investigations among students, families of professional men, and especially of wage-workers and the poor in cities and in the country, including the negroes in the Black Belt of the South. A number are making immediate use of the information which they gather in their own regions, while all send results to Washington for publication in detail and for general distribution. Another advantage is that the funds provided from the public treasury are economically and wisely used to aid inquiries which receive support from other sources as well. By this unselfish and extensive co-operation of individuals and institutions, under the best possible conditions, a large amount of work is being done in a systematic way, and the results are made available to the public at large.

THE RESULTS OF THE INQUIRIES.

So much for the development of the food investigations. But what are the results already gained, and what is to be expected in the future? One thing which is brought out by these and other investigations is that we make a fourfold mistake in our food economy.

1. We purchase needlessly expensive kinds of food. We use the costlier kinds of meat, fish, vegetables, and the like, when the less expensive ones are just as nutritious, and, when rightly cooked, are just as palatable. Many do this under the impression that there is some peculiar virtue in the dear-food materials, and that economy in their diet is somehow detrimental to their dignity or their welfare. And, unfortunately, those who are most extravagant in this respect are often the ones who can least afford it.

2. Our diet is apt to be one-sided. It often does not contain the different nutritive ingredients in the proper proportions. We consume relatively too much of the fuel ingredients of food—those which are burned in the body and yield heat and muscular power. Such are the fats of meat and butter, the starch which makes up the larger part of the nutritive material of flour, potatoes and sugar, of which such enormous quantities are eaten in the United States. Conversely, we have relatively too little of the protein or flesh-forming substances, like the lean of meat and fish, and the gluten of wheat, which make muscle and sinew, and which are the basis of blood, bone, and brain.

3. We use excessive quantities of food. This is true not only of the well-to-do but of many people in moderate circumstances also. Part of the excess which is bought is thrown away in the wastes of the kitchen and the table, so that the injury to health from overeating, great as it may be, is doubtless much less than if all of the food we buy were actually eaten. Probably the worst sufferers from this evil are the well-to-do people of sedentary occupations—brain-workers as distinguished from hand-workers. Not everybody eats too much; indeed, there are some who do not eat enough for healthful nourishment. But there are those, and their name is legion, with whom the eating habit is as vicious in its effect on health as the drinking habit, which is universally deplored.

4. And finally, we are guilty of serious errors in our cooking. We waste a great deal of fuel in the preparation of our food, and even then a great deal of the food is very badly cooked. A reform in the methods of cooking is one of the economic demands of our time.

THE COMPOSITION OF FOOD MATERIALS—NUTRITIVE INGREDIENTS.

We have seen that the investigations referred to have shown the amounts of nutritive ingredients and other substances which are contained in our ordinary food materials.

In discussing this subject, we must take a different view of food from that to which we are accustomed, and consider, not the food as a whole, but the nutriment it actually contains, which is a very different thing. We must take account of its chemical composition—its nutritive ingredients and the ways in which they are used to nourish our bodies. We must talk, not of beef and bread and potatoes, but of protein, carbohydrates, and fats.

The terms protein, proteids, and albuminoids are used somewhat indiscriminately for the nitrogenous compound in plants and in the animal body. The myosin which forms the basis of lean meat and of the flesh of fish, the ossein of bone, albumin of egg, casein of milk, gluten of wheat, and the like, are protein. Of the fats we have examples in butter, olive-oil, and the oils of corn and other vegetable foods. Carbohydrates do not occur to any extent in meats and fish, but are found in milk as milk-sugar, and are the chief nutritive (starchy) ingredients of vegetable foods. The mineral matters, and water also, are necessary for nourishment; but we do not generally take them into account in studies of dietaries.

Food nourishes our bodies in two ways: it builds and repairs our tissues, and it serves for fuel to yield heat to keep the body warm and to give it force and strength to do its work. The protein compounds are the building material. They are sometimes called "flesh-formers," because the flesh — *i.e.*, muscle and sinew — is formed from them, though they make blood and bone as well and can also be transformed into fat. The fats and carbohydrates are the fuel ingredients. Both of them are transformed into the fat of the body, which is its reserve of fuel. The protein can serve as fuel also, but the fats and carbohydrates cannot build nitrogenous tissue, for protein contains nitrogen and they do not. Chemists have devised ways for estimating the fuel value, or, to use a more correct term, the potential energy of the nutrients of food. This is expressed in heat units, called calories, the calorie being the amount of heat that would raise a kilogram of water 1 degree Centigrade, or one pound of water about 4 degrees Fahrenheit. One calorie corresponds to 1.52 foot-tons. A gram (453.6 grams make 1 pound avoirdupois) of protein or a gram of carbohydrates is estimated to contain on the average 4.1 calories, and a gram of fats 9.3 calories of energy. A pound of rather fat sirloin of beef would contain about 900, a pound of butter 3500, a pound of wheat flour about 1600, and a pound of potatoes 340 calories. The potatoes yield so little because they are three-quarters water, the butter so much because it is mostly fat. In the adjusting of diet to the demands of the body, the important matter is to provide enough protein for the building and repair of tissue and enough energy to keep it warm and do its work. Considering the body as a machine, there must be material to make it and keep it in repair, and fuel to supply heat and power. If there is not food enough, or the nutriments are not in the right proportions, the body will be weak in its structure and inefficient in its work. If there is too much, damage to health will result.

The average wage-worker in the United States is said to earn not over $500 a year. When his wife goes to the market to buy supplies for the table she is thinking of meat and flour and potatoes, what they cost, and how the folks at home will relish them. She does not realize the fact that she is actually buying certain nutritive substances, flesh-formers, and fuel ingredients, which she and her husband need to repair the wastes of their bodies, and to give them strength for their daily toil, and which their children must have for healthy growth and work and play. The real problem, though she does not understand it, is to get the most and the best nutriment for her money.

The members of the family need, as an essential for the day's diet, a certain amount of protein to make blood and muscle, bone and brain, and corresponding quantities of fat, starch, sugar, and the like, to be consumed in their bodies, and thus to serve as fuel to keep them warm and give them strength for work—a larger amount for the father, with his active muscular labor; somewhat less for the mother, with her smaller body and lighter work; and quantities for the children according to age, growth, and occupation. Of course, they need other substances, like mineral salts, which are contained in the food, and the water of both food and drink, and they want and will have things like salt and spice and tea and coffee, which gratify the palate but are only more or less useful for nourishment.

If her husband is engaged at moderately hard muscular work, like that of a carpenter or mason or active day laborer, he should have in his day's food, say not far from 0.28 pound of protein and enough carbohydrates and fats, so that the fuel value of the whole be about 3500 calories. The wife, if busy at work with her hands about the house or otherwise, will need perhaps eight-tenths as much. If the children are two boys of thirteen and eight and two girls of ten and five years of age, they will need enough to make the wants of the whole family equivalent, let us say, to four men at moderately hard work. This would require 1.12 pound of protein, and a fuel value of 14,000 calories.

If this family live in a village or city in Massachusetts, about $300 of their annual $500 would be expended for food. Will it be expended wisely?

The real problem before this woman when she goes to market is to obtain the needed amounts of protein, fats, and carbohydrates at the lowest cost. Flavor and appearance are things to look out for, of course. She may buy them in the food if she has the money and is willing to spend it, but they are costly. She may supply them by good cooking and tasteful serving; but this will take skill and care, and too many women in her circumstances lack the one and are averse to the other. Or she may ignore both flavor and appearance, and if her husband does not like the food she sets before him, and other things about the home are not attractive, he will very likely go to the "poor man's club," otherwise known as the saloon.

The training of a well-ordered home or the cooking school will tell how to make savory dishes from inexpensive materials. A little of the chemistry of the subject will show how to select them.

CHEAP AND DEAR FOODS.

To get at the actual cheapness or dearness of different food materials we must take into account both the composition and the price. Suppose, for instance, our would-be thrifty housewife, in buying food at the market for her family, wishes to obtain the largest amount of nutriment for her money. What kind shall she select? To put it in another way, How much of tissue-formers and fuel-value can she obtain for a given sum—10 cents, for instance—in beefsteak, flour, or potatoes, as she ordinarily buys them?

If she spends her dime for beefsteak at 20 cents a pound, she gets half a pound, which supplies 0.08 pound of protein and 550 calories of energy; but if she invests the same money in flour at 2½ cents a pound, she has four pounds, with 0.44 pound of protein and 5680 calories of energy.

The most striking fact brought out by all these calculations is the difference between the animal and vegetable foods in the actual cost of nutriment. Meats, fish, poultry, and the like are expensive, while flour and potatoes are cheap food. The reason of this is simple. The animal foods are made from vegetable products. Making meat from grass or grain is costly. An acre of land will produce a given number of bushels of wheat, but when the grass or grain which the same land would produce is converted into meat it makes much less food than the wheat.

We cannot judge of the nutritive value of food by the quantity. There is as much nutriment in a pound of wheat flour as in seven pounds, or three and a half quarts, of oysters. There is still less connection between nutritive value and price. In buying at ordinary market rates we get as much material to build up our bodies, repair their waste, and give us strength for work in 5 cents' worth of flour or beans or codfish, as 50 cents or a dollar will pay for in tenderloin, salmon, or lobsters. The maxim that "The best is the cheapest" does not apply to food. The best food in the sense of that which is sold at the highest price is rarely the most economical for people in health.

STUDIES OF DIETARIES—ACTUAL FOOD CONSUMPTION.

One interesting part of the food investigation has been the examination of the kinds, amounts, and cost of the foods actually purchased and used by different people. These studies are made by going into the houses, weighing the food, taking specimens for analysis, doing the same with the table and kitchen wastes, observing how many people sit at the table, and thus find how much is purchased per person and how much is actually eaten. These experiments may continue during a longer or a shorter period, from three days to a month.

One of these studies, for instance, was that of a boarding-house in Connecticut. The boarders were mostly men. Several of them were machinists earning $3 a day or more. The experiment continued for one month, during which time the chemist who conducted the work sat at the table. At the outset he took an inventory of flour, potatoes, canned meats, and other food materials on hand in the pantry and cellar. Each day as the food was purchased the articles were weighed. At the end of the period another inventory was taken of the food on hand. When the potatoes were pared, both potatoes and parings were weighed. When the table was cleared the refuse, which ordinarily would have gone into the garbage-barrel, or have been sold to the soapman, was saved with the potato-parings and other kitchen wastes, dried, and taken to the chemical laboratory for analysis, where specimens of the meat, flour, and other food materials were likewise analyzed.

Along with the composition of the food, the costs were also noted. Accurate account was kept of the number of persons—men, women, and children—at each meal. In this way accurate statistics were obtained of the food materials purchased, their cost, the actual amount of nutriment in each, the nutriment in the refuse and waste materials, and the amounts of nutritive ingredients actually consumed. Dietary studies have been going on during the past year in a large number of places from Maine to New Mexico, from North Dakota to South Carolina. Not all of them, however, have been made with so much detail as the one in Connecticut above cited. In some instances the food is not weighed, but the quantities are taken from the grocers' and butchers' bills; and instead of analyzing specimens, the composition has been inferred from analyses of other materials. Taken altogether, not far from two hundred such dietary studies have been thus far carried out in the United States, the majority of them in connection with the food investigation here described.

THE HIGHER SCIENCE—NEED OF RESEARCH.

One theory upon which Professor Atwater insists most earnestly is the need of abstract research. While the investigator must be the truth-seeker, he should seek that kind of truth which will be most useful to his fellow-men, and he must not forget that what seems on the surface the most practical is often very far from the most valuable. With us in the United States to-day, abstract truth is too often neglected. A great deal of scientific investigation fails of its purpose because, in the attempt to make it practical, it is not sufficiently accurate and thorough. We are too apt to forget that the laws of nature—the abstract principles—must first be found out, and that when they are discovered the practical application will follow. The way to hit a distant mark is to aim not at it but over it. One great trouble with American science is that we do not aim high enough. This, Professor Atwater's wide experience and contact with the best investigators in this country and in Europe, has made him feel most deeply. He insists upon it in his lectures to his students. It is his frequent theme in his more public addresses and his writings. As director of the office of experiment stations, he urged it upon station-workers and boards of control. It is a guiding principle in the work of his own library and laboratory. This, indeed, is the explanation of the fact that he has been working for ten years upon the development of an inquiry upon the chemistry of metabolism, and that four years of the labor of himself and his associates have been devoted to the elaboration of the respiration calorimeter, which is intended for research in this direction. All this has been done while scarcely a word about it has been put in print except some of the facts have been gotten hold of by outsiders, despite the effort to keep them until they are ripe for publication.

In an article upon the need of abstract research, Professor Atwater has said:

"Much that is pressingly demanded requires peculiar facilities for its production, such as are found only in the laboratories and libraries of the great educational institutions, and is dependent for its best development upon the intellectual attrition and the opportunities for continuous study which such establishments alone can offer. In the European universities these facilities are provided by the government; with us they depend mainly upon private munificence. Whatever may be one's theory about the duty of the State and of the individual in such matters, the simple fact is that in this country government will not provide for it, and we must look to private munificence for its support. The endowment of research is one of the most useful forms of public benefaction. Here is a way in which it may be made extremely useful. A laboratory built and equipped for a sum which many a man invests in a house at a watering-place, or a pleasure yacht, and an endowment that would yield a revenue equal to the annual cost of the house or yacht, would bring results of untold value to the world, and to the donor the richest reward that a lover of his fellow-man can have."

THE FOOD-SUPPLY OF THE FUTURE.

But what of the future supply of food for man? Will the earth always furnish enough for its constantly increasing population, or will the time come when the number will be too great, when there will be more than can be fed? The doctrine of Malthus predicts the ultimate starvation of a portion of the race, with all its attendant horrors. Professor Atwater takes the opposite view, and even goes so far as to say that with the aid of science there is every reason to believe that the coming man will be better fed than we are to-day. On the one hand the population does not increase as the Malthusian theory assumes. On the other, although there is a limit to the possible production of food, it transcends all idea that ever occurred to Malthus or the people of his times. We are accustomed to think that the food-supply is limited by the fertility of the soil, but modern chemistry has shown that food-production may be entirely independent of the soil. It may be made not only independent of the soil fertility but independent of the soil itself. Of every one hundred pounds of the flour of which our bread is made only one pound comes from the soil. The other ninety-nine are furnished from the air, and the supply is inexhaustible. That which comes from the soil can easily be returned in the form of manure and fertilizers. It can be supplied to the most barren sand and can make it produce crops of a luxuriance unmatched even by the virgin prairie.

Indeed, plants may be grown, not in soil at all, but in water, to which a minute quantity of the ingredients of plant-food have been supplied. This method of growing plants by water-culture, as it is called, has been developed in Germany more than anywhere else. Professor Wolff, of the Agricultural Experiment Station in Hohenheim, raised four oat-plants in this way with forty-six stems and 1335 well-developed seeds. Professor Nobbe, of the Experiment Station in Thurand, thus grew in jars of water a Japanese buckwheat-plant, nine feet high, weighing, when air-dry, 4786-fold as much as the seed from which it was produced, and bearing 796 ripe and 108 imperfect seeds. Wheat, maize, and other plants, and even trees are grown in this way. Professor Nobbe now has some trees produced by water-culture from seeds of others which also had never been in soil at all, but had grown with their roots immersed in water. The requisites for such plant-growth are proper temperature, water, and certain elements of plant-food, of which very minute quantities suffice. Given these and the air will supply the rest, and if other conditions are right abundant yield will be sure. Thus cultivated they are in every way healthy and attain a more than tropical luxuriance.

The fundamental mistake out of which grew the gloomy doctrines of the older theorists was in measuring the possibilities of food-production by what they knew of soil-culture. Science had not revealed to them that aside from proper temperature and moisture the essential factor in vegetable production is plant-food, that nearly all of this can be supplied in abundance by the air, and the slight residue which is needed can be obtained in almost unlimited quantity in the earth, so that the possibility of the future is measureless.

The world's future food-supply is conditioned on two things. One is plant-food, the other is the energy, power to manufacture and transport food and to transport water. The only elements of plant-food about which there has ever been any question are phosphorus, potassium, and nitrogen. The chemist and the miner have already found supplies of phosphorus in phosphates and in rocks, and of potassium in rocks and in potash mines, enough to supply the needs for plant-production through countless ages. As to the nitrogen, science has lately revealed that leguminous plants may gather it in abundance from the air, four-fifths of which is made up of this element. With the unmeasured energy of the wind, flowing water, and the tide, to say nothing of the immensely greater energy of the sun's heat and the possibility of storage, transfer, and use of energy by electricity and other agencies, we may hope that the science of the future will provide the power.

The amount of vegetable growth that is possible within a given area is so great that the densest population would be incapable of using it. And even if it were conceivable that population should become so dense as to consume more food than could be produced by the natural growth of plants, there still remain the sources of artificial manufacture of food, of which we are hearing so much of late. And if one may be allowed to reason from analogy, the inference for the production of food would be—what has actually been found to be the case in the recent production of other commodities—that what is needed to make food more abundant and more cheap is enough population to make sufficient demand. So, strangely yet simply, it comes about that in providing of what is essential for the best welfare and highest happiness of mankind in the future, the things which have heretofore seemed the furthest from our reach—nitrogen and energy—are the very ones which Providence places about us at all times and in utterly inexhaustible amounts. The capacity of man to consume food is limited. The possibility of its production is almost limitless. The very increase of population which the Malthusian doctrine makes the cause of starvation will thus become the condition of cheap and abundant sustenance. So the use of man's brain transforms the prospect of dire calamity, of misery ineffable, into the promise of inexpressible blessing.

THE FOOD OF THE POOR.

The studies of the foods of people of the poorer classes, especially in the large cities, are full of interest. We have been wont to say, "The destruction of the poor is their poverty," but here it is rather their improvidence. They suffer less from lack of money than from lack of economy in its use. Very often this bad economy is due to pride and unwillingness to economize, and often it is due only to ignorance.

A large number of the investigations just referred to were made by a lady physician, who has practised for a number of years among the poorest people in New York. She lately remarked: "I think I know personally at least four hundred families in the worst congested region of this city. I have practised my profession among them, am familiar with their ways, their family histories, and many of their family tragedies. I have seen a great deal of the mission-work done among them by religious organizations, and can bear most emphatic testimony to its usefulness. But if I were to say where the philanthropist must begin if he will improve their physical, and hence their intellectual and their moral condition, it would be at the table. There is no one respect in which there is so great need of reform among them—no one way in which so much good can be done as in the improvement of their food and their nutrition."

FOOD OF ASIATIC RACES.

The well-known missionary, Bishop Thoburn, says: "Half of the people of the world are habitually hungry. Not that they feel the pangs of hunger, but their natural cravings for food are not completely satisfied." Few of us realize that the majority of mankind are underfed. A large part of the population of Europe subsists upon a diet which is very small in comparison to that to which we are accustomed in the United States. But even they are well nourished in comparison with millions of people in Asia. The few accurate investigations that have been made of the food of the poorer classes of India and Malaysia indicate average amounts of protein and energy in their daily diet, which would seem to us barely sufficient to keep soul and body together. A missionary of long experience in India, who has made very careful observations of the conditions of living of the poorer classes, lately cited some statistics showing the amounts of food consumed annually by families of the lower class, of which there are said to be sixty millions in that country. Applying to the quantities of food consumed daily by these people the results of chemical analysis made of similar materials, it appears that the fuel value per man per day cannot be over 1400 calories, while a current European standard calls for 3000, and an American one 3500 calories in the daily food of a man of moderate muscular work. In connection with the studies of food at the World's Fair, above referred to, an investigation was made of the diet of the people of the Javanese village, who were living very much as they do at home. Their daily food averaged about 1400 calories per day. If a man feeds his horses one-half as much as experience shows an average horse needs for average work, what sort of work would result? What would be expected from a horse which had never had any better feeding than this? What can we expect either of physical or moral vigor from communities that live on the physical plane of millions in the Orient? It is all very well to send the gospel to the heathen, but the same Providence whose laws the missionary tries to explain has ordained that man's mental and moral condition shall be intimately bound up with his physical welfare. "If we would care for men's souls, we must care for their bodies also." Is not here a suggestion for the missionary societies?

COMPARATIVE NUTRITION OF MANKIND.

This leads us to a larger subject, the comparative nutrition of mankind. The data for judging of the kinds and amounts of nutriment in the foods of the different nations of the world are as yet entirely inadequate, but the study is one of incalculable importance, and the beginnings are already made. Not only are dietary studies now being prosecuted with great vigor in Europe and the United States, but of late a considerable number have been reported from Japan, Malaysia, and Abyssinia. Each investigation stimulates others. Investigators and philanthropists are coming to interest themselves in this as a necessary adjunct to physiology, sociology, and anthropology. Inquiries are rapidly increasing One of the scientific branches of our government has already under consideration a plan for collecting all of the facts on this topic which are accessible in different countries of the world. There is every reason to believe that information will gradually accumulate so that at some time, perhaps in the not very distant future, enough may be available to justify the student in designating the classified results as the science of the nutrition of mankind.

THE MILK QUESTION.

ALTHOUGH the milk question has probably always been a subject of warm discussion, never has so much been said and written upon it and from so many different points of view as in the last five years. The bacteriologist, the veterinarian, the pediatrist, the chemist, the legislator, and even the philanthropist have busied themselves with the matter; medical journals have teemed with literature pertaining thereto; commissions have been appointed to investigate the milk-supply of cities; many laws have been proposed to regulate the traffic; large industries based upon the deductions of specialists have been put into operation; private charity has been stimulated to establish depots for providing the infants and invalids of impecunious families with pure and sterile milk; and yet the death-rate of children under five years of age shows little or no reduction, and hand-fed babes die in summer now as they did twenty years ago.

We have thought that a short review of the situation as it presents itself might prove of interest if not of value, although we regret that we have no solution of the problem to offer.

First of all, chemists have been engaged upon new analyses of human milk, and find reason to estimate the percentage of albuminous matters at lower figures than have been given in previous formulæ. In the formulæ of König, Pfeiffer, and Leeds about 1 per cent. of albuminoids is given as the amount commonly present. Heubner, Forster, Hoffman, and Johannisen find that the average amount is nearer 1 per cent. than 2 per cent.; Heubner places the figure at 1.05 per cent. and Hoffman at 1.07 per cent. Dr. A. V. Meigs, thirteen years ago, in a paper read before the Philadelphia County Medical Society, contended that human milk never contained more than 1 per cent. of casein. In order therefore to make cow's milk correspond with human milk the proteids will need to be reduced two-thirds instead of one-half, as was the former custom. Wroblewski has studied the nature of the casein of human milk as compared with that of cow's milk and finds that the former contains less carbon, nitrogen, and phosphorus than the latter and more hydrogen and sulphur. That the caseins of the two fluids never behaved alike has long been known, and the failure to sufficiently recognize this fact may account for some of the unsuccessful attempts in infant-feeding attending the substitution of cow's milk for human milk.

Biedert believes that the less digestible casein present in cow's milk constitutes a more favorable medium for bacteria to flourish in. Heubner, however, has not been able to find in the fæces of healthy children fed on cow's milk a greater quantity of undigested casein, though he has found a greater amount of other nitrogenous matters

The importance of milk as a factor in the causation of digestive disorders in the infant has attracted the attention of many medical men, and the literature on the subject is quite voluminous. According to Krisowski, of 1000 breast-fed infants only seven die from digestive disorders, while of 1000 fed on cow's milk 67 perish from such diseases. Although the chances for living are very poor for the hand-fed babe, the mortality of the first year of life is extremely high for all infants. Eröss finds that 44.8 per cent. of all children that die in the first month of life die before they are a week old; that 25 per cent. of the first month's mortality occurs on the first day of life, and at least 10 per cent. of the deaths of the first year happen within a month after birth. While noting these facts we must not ignore causes other than those relating to nutrition that affect infants fatally. The children of the poor have a much higher death-rate than the children of the rich. The impure air of closely crowded rooms may affect injuriously a young infant's health as much as improper food. According to Fischl, Epstein, and Eröss, septic infection through the navel is responsible for many of the deaths in the newly born. In such facts as these may be found one of the reasons why improvement of the milk-supply has not as yet been followed by any considerable lowering of the death-rate.

Neumann, in his own clinic, finds that the children suffer equally from digestive troubles whether they are fed on milk direct from the cow, so-called country milk, or milk that has passed though the hands of several dealers and is retailed over the counter. His patients are derived chiefly from the poorer classes, and therefore the food is not the only disease-producing factor.

To the very long list of substitutes for human milk there have recently been added several modifications of cow's milk, considered of value by their introducers. Among these is the "Fett-milch" of Gaertner. This retains all the cream, the milk being first diluted with an equal bulk of water and the mixture being placed in a specially constructed separator, which allows one-half of the proteids to pass off with the skim-milk. Only a slight addition of sugar is needed to bring the product up to the required standard. Kehrer, on the other hand, uses a milk-serum obtained by the rennet-ferment, and he claims that in this process the digestible proteids alone are retained. Cream is then added to supply the amount of fat needed. Hempel, in order to avoid the use of cow-milk casein, adds egg-albumin to a mixture of cream, milk-sugar, and water, and claims good results from this "egg-albumin milk." Many authorities prefer skim-milk, with cream added, to the whole milk; and as skim-milk, in the larger dairy establishments at least, is obtained by means of a centrifugal separator, the product is freed of the dirt that it usually contains after milking.

Much has been said for and against the theory of the infectiousness of milk from tuberculous cows. Very few investigators have ever been able to find the bacilli of tuberculosis in the milk of cows not suffering from disease of the udders. An investigation undertaken by Dr. H. C. Ernst for the Massachusetts Society for Promoting Agriculture, and extending over a period of two years, conclusively showed that cows whose udders were unaffected, yet who were suffering from tuberculosis in other organs, yielded milk in which tubercle bacilli were found; and such milk when fed to healthy calves rendered them tuberculous. Of 36 cows under examination 12 produced milk in which tubercle bacilli were detected on one or more occasions, and of 21 healthy calves fed on the milk of these cows eight became affected with tuberculosis.

When we consider that according to Peters 26 per cent. of 165 herds examined in 17 North American States were found tuberculous, and that the statistics of German abattoirs reveal the fact that from 10 per cent. to 15 per cent. of all the cattle slaughtered are found to be tuberculous, the danger of infection from the use of milk cannot be overestimated. The laws that have been enacted in several States looking toward the destruction of tuberculous cattle cannot in our estimation be too rigidly enforced, if the results reached by Ernst are at all worthy of acceptance. The experiments themselves are of such a simple nature that the results ought to be speedily confirmed or corrected by other authorities.

Another question that has been the subject of much discussion is that of milk sterilization. If milk is fatal to young infants because of the bacteria that find in it a favorable soil for development, the destruction of these germs by heat ought to render the product innocuous and harmless. How to destroy the bacteria without injuring the value of the milk has been the problem.

Flügge persists in the statement previously made by him that, in order to destroy the dangerous germs that are likely to infect milk and that cause peptonization, a higher degree of heat than the one used in Pasteurization is necessary, and that for ordinary purposes cooking on a water-bath for ten minutes is as effective as any process of sterilization now in use. On the other hand, many authorities, including Baginsky, Troitsky, and Backhaus, still urge the use of the ordinary Soxhlet form of sterilization, and claim for it that if a perfectly sterile milk is not obtained thereby the procedure is far preferable to cooking and the product is at least much better than raw milk.

Baginsky shows that milk is rendered harmful through three causes: First, from the non-pathogenic germs that set up various fermentations; second, from pathogenic organisms and their toxic products; and, third, from the germs that are present in the intestine of the child and that find in the ingested milk a suitable nidus for the generation of toxins. Sterilization can only partially lessen the dangers from the first and second causes, but it cannot affect the third.

Auerbach considers the application of steam at a temperature of 115° C. and under pressure for a few minutes as effective as any form of sterilization.

Backhaus contends that the advantages of sterilized milk are greater when the milk is prepared in large establishments than when it is sterilized by the consumer; the liability of contamination by frequent handling is lessened and the chances are that the milk is in a fresher condition.

All writers are agreed upon the necessity of keeping the dairy strictly clean, of observing the rules of cleanliness in milking, and in the transportation of milk, cooling the milk immediately after it leaves the cow, and keeping it cool until it can be sterilized. Of course, no amount of precaution on the part of those who prepare the fluid will be effective if the sterilized product is exposed in a filth-laden atmosphere by a careless or ignorant mother. Bottles containing just sufficient milk for one feeding are generally advised and are to be preferred to the preparation of milk in bulk.

In many European and a few American cities milk can be had prepared with great care and according to any formula; the dairies are under strict supervision, the milk is carefully guarded from contamination, is examined frequently by chemists and bacteriologists, and is treated according to scientific principles. In Göttingen, Germany, milk is commonly sold for five cents a quart, while carefully prepared "children's milk" can be had for ten cents a quart. Sterilized milk can be bought in Philadelphia, in separate bottles holding eight ounces each, for twenty cents a quart.

Private philanthropy has established "sterilized milk depots" where good milk can be obtained in sterile and unsterile condition for less than cost. Some of these organizations have been called into existence simply to satisfy a desire for publicity and notoriety, and have met with deserved failure. In other cases lack of technical knowledge, together with business inexperience, have caused the attempt to be abandoned, but most often the expense has been too heavy, and the money that a charitable public was expected to contribute was not forthcoming.

Neumann, of Berlin, and others who have been working among the children of the poor hold that the municipality should take upon its own shoulders the maintenance of suitable dairies and supply the children of the poor with proper nourishment at cost, as it now furnishes its inhabitants with pure water and endeavors to keep the air pure. This is one step further in the line of recent legislation, both in Europe and America, tending to increase the responsibility of the State in preventing disease, and if an improper milk-supply causes the death of thousands of infants, why not endeavor to prevent this waste of child-life by turning dairyman and giving every one the opportunity to obtain the purest and safest milk possible? Such at least are the arguments of those who favor State control. Paris has in connection with one of its municipal *crèches* a dairy controlled by the municipality, and children's hospitals and foundling-institutions have been urged by various writers to manage their own dairies. France is very desirous of increasing her population, and is endeavoring to do so by preventing waste. Other countries have not yet reached the point where the births per 1000 are less than the deaths, and therefore are not yet so much concerned about the 25 per cent. mortality of yearlings.

If the mammary gland of the human female is becoming atrophied, and infants do not thrive on cow's milk, no matter how carefully prepared or modified, might it not be well to consider what can be done to furnish all infants with their proper food, namely, human milk. If the child can be fed at the breast during the first year of its life the chances are ten to one that it will live beyond its fifth year, and that period past, the expectation of life is a pretty good one. Would it not therefore be well for medical men to direct their energies toward bettering or rather increasing the number of human milkers instead of looking for substitutes? If physical reasons prevent a woman from giving suck to her own child, the causes and the means to overcome the obstacles ought to be discoverable.

If, as in many cases, personal convenience is at the root of the trouble, then surely society should be taught its duty, and public opinion be so educated that it will consider it a disgrace and a crime for a woman to refuse to nurse her offspring when she is capable of doing so.

Not only is such an act an unwarranted cruelty inflicted on the infant, but in a large percentage of the cases it is as fatal to the child's life as if it were disposed of in some fouler way. The mother who, because of poverty, abandons her offspring, is sent to the work-house, and the child is taken from her. Is it less culpable for a mother to refuse her infant its proper food when that food is at hand?

If the time and talent now expended in endeavoring to obtain a pure supply of cow's milk were directed to this other question, and the subject freely discussed in the lay press as well as the medical journals, we would have a lessened infant death-rate, and the problem "How and what to feed the baby" would not excite so much attention as it now does.—*Med. News.*

Department of Hygiene.

WITH SPECIAL REFERENCE TO STATE AND PREVENTIVE MEDICINE.

TO MAINTAIN HEALTH IN THE PUBLIC SCHOOLS.

THE PRESIDENT'S ANNIVERSARY ADDRESS, DELIVERED AT THE NINETEENTH ANNUAL MEETING OF THE ORANGE COUNTY MEDICAL SOCIETY, MAY 5, 1896.

[A. E. ADAMS, M.D., President of the Orange County Medical Society, read the following paper at the nineteenth annual meeting of the society, in Goshen, on May 5, 1896:]

At a meeting of school superintendents held in Newburgh last October, State Superintendent of Public Instruction Charles R. Skinner said: "If we had better laws concerning the instruction in the laws of health we would have pupils and teachers who would know better how to maintain health, we would have better light in the school-rooms, and we would see fewer children on the streets wearing glasses. We would see the rooms better ventilated and the children better clad. But whatever we teach in this line, let it be not only the truth, but the scientific truth."

A law which requires attendance at school should also require suitable supervision of the hygienic conditions of the school. Can some one tell me who performs the important duty at present?

Will any one deny that the public schools should receive as much attention, and have as careful sanitary inspection as factories?

Poor ventilation is probably one of the worst of the evils school-children have to contend with. With the flues dead or working the wrong way, it is an easy matter to get more than seven volumes of carbonic acid in a school-room—in fact most of the school-rooms average about thirty volumes.

We are careful to dispose of the fæcal and urinary waste, but neglect the emanations from the lungs and skin, discharging ears, decayed teeth, and fetid eructations. It has been estimated that fifty pupils in a school-room for five hours each school-day in a month would throw off, in the form of cutaneous and pulmonary exhalations, 750 pounds. All this weight of matter must find its way out of the flues and windows, or settle down on the floors, desks, seats, and window-sills, where it dries out and becomes the finest kind of dust.[1] When dry, it is easily stirred up and again circulated in the atmosphere by every draft or current of air.

Carnelly found "in dirty school-rooms with the so-called natural ventilation, in the same volume of air, nearly two thousand living bacteria, while in mechanically ventilated schools there were from thirty to three hundred." Drafts should always be avoided; also damp clothing and wraps in the school-room.

Consumption is increasing with increasing population and cannot be considered with indifference. In round numbers one-seventh of all the deaths are due to consumption, or about one hundred thousand per annum. We are now forced to take the position that tuberculosis is a specific disease caused by a specific germ—the bacillus tuberculosis. We all admit that the chief method of infection is from the dried sputum, and I ask, Is it right that the constitutionally weak children, often with a hereditary predisposition to consumption, should be compelled to sit for four or five hours in a day, and inhale that which will possibly destroy their lives?

Dry bacilli will preserve their vitality for at least six months.

One child with tuberculosis who attends a public school, and is allowed to expectorate on the floor of the school-room or halls, endangers every predisposed or debilitated individual in the building.

Dr. G. H. F. Nuttall, of Johns Hopkins University, has estimated the number of bacilli expectorated in twenty-four hours. As an example I will give his estimate in one case. The number varied from between three and four hundred millions to four billions on different days.

Some of the other cases were estimated in the billions, while others were only counted by the millions. Of course some cases in the earliest stages would be placed in the thousand column.

To those who say that tuberculous children and teachers would not expectorate on the floors of the school-rooms, halls, or stairways, I would say: We know that tuberculous patients cough and expel the bacilli from the lungs into the mouth. Where can they dispose of them? Shall they be compelled to swallow them and take the chances of infecting other portions of their bodies?

Until the State Board of Health rules that tuberculous subjects shall not attend the public schools, we should be untiring in our efforts to secure individual cuspidors attached to each seat occupied by a child who has "a cough," and have other cuspidors placed in suitable positions in the halls and especially in the stairways.

The cuspidors should be kept partially filled with some germ-destroying solution.

Every school should be required to furnish individual drinking-cups. It is not necessary for me to enumerate the diseases which may be transmitted by using the common drinking-cup, towels, etc. It has been demonstrated that the diphtheria bacilli do not disappear from the secretions of the throat for many days (more than a month in some cases) after the patient is apparently well. I believe the drinking-cup is the usual source of contagion of this dreaded disease in the public schools. Recent research would lead us to suspect that the earliest stage of scarlet fever—even before the eruption appears—can be communicated in this way. The habit or rule of pupils exchanging or borrowing books should be condemned on hygienic principles.

A moderate number of bacteria can be removed from the floors by a stream of water from a hose; but with a scrubbing-brush and soap 99 per cent. can be removed. Fresh oil paint, even over a coat of old paint, will leave the surface sterile.

With the windows all open and the floor well dampened, each room should be well swept every afternoon and the following morning should be carefully dusted with a damp cloth. The dust, if examined, will be found to contain enormous numbers of pyogenic staphylococci, streptococci, etc. At least every other day the floors should be thoroughly scrubbed with soap and water.

Sunlight is not only a good disinfectant but dries out moisture and should be admitted freely, but never so that it strikes the pupil in the face. More than one school-room in the county has this very objectionable feature.

The model school-room should have not less than three hundred cubic feet of air-space, and twenty-five square feet of floor-space for each child. Each room should have high windows on two sides. The window-space should equal one-sixth of the floor-space. The pupil should be seated so that the best light will come from the left side. This is especially desirable while writing. The position of the body while writing and the character of the writing was one of the subjects considered by the Council of School Superintendents. Supt. Whitney, of Ogdensburg, favored the vertical penmanship. At one time he "had a prejudice against the system, although satisfied on the hygienic side of the question." As a result of his observations he found that "the teachers had succeeded in getting the children to write the orthodox slant and to sit so that the spine had the orthodox curve."

Krugg studied 1418 children. "One-fourth to one-third had curvature of the spine due to faulty position while at work." The most common curvation is to the left. The most frequent location is behind the breast. The second most frequent location is in the lumbar region, and the third in the cervical region. The tendency to curvation of the spine increases till the thirteenth year. Adjustable seats and correct position while at work, especially while writing, would undoubtedly reduce the enormous percentage of crooked spines.

The practice of giving children money with which to buy pastry for their lunch is a serious mistake. From seven to seventeen the body develops rapidly, and solid, substantial food is required three times a day.

The great number and size of the schools in our large cities make it impossible for them to be managed or taught except in a methodical way. Teachers are expected to have their pupils advance to a certain class or grade in a specified time, and this without regard to capacity, mental or physical.

I will not at this time criticise the various studies and character of the work required of the pupils, but must say that the multiplication of studies in the high schools is a great tax, and I think that frequently the superior advantages lead to inferior results. Let us consider the prospective benefits of the course of study as it is now required. We know that the great majority are destined to labor for the sustenance of themselves and families. You and I know that good health is of prime importance. Without it, refinement and a high education will not insure success, much less happiness. The great mental energy necessary requires extra nutrition for the nervous system, and at the expense of other body development. Nothing is more certain than that, for many children who are prone to disease, but yet not actually diseased, physical training may make all the difference between a healthy life and a miserable existence or an early death.

Physicians should disseminate among parents more knowledge of the necessity of physical exercise during this the formative period of life, and insist on the physical and mental development receiving an equal amount of attention. I am afraid medical men can be justly accused of abstaining from this share of their duties to the public, leaving the subject almost entirely to the superintendents and teachers, who, of course, are most interested in developing the mental faculties. They certainly have succeeded admirably, for the youth of to-day has as much learning at the age of ten as the youth of twenty years ago had at the age of thirteen or fourteen.

As long as teachers and ambitious parents consider the present time only, just so long will we have a large number of weak and nervous individuals graduating from our high schools and colleges, who are illy prepared for an active business life or the functions of wife and mother.

The renowned Dr. Wm. Goodell said: "If woman's health must be sacrificed on the altar of higher education, the time may come when, to renew the wornout stock of this republic, it may be necessary for our young men to take the hint thrown out by another, and make matrimonial incursions into lands where educational theories are unknown." In another place he said: "So commonly do I find ill-health associated with brilliant scholarship that one of the first questions I put a young lady seeking my advice is, 'Did you stand well at school?'"

A careful observer finds that 40 per cent. of boys and 61 per cent. of girls in the high schools complain of some illness.

Investigation has demonstrated that children under sixteen years of age who devote to work one-half of the six school and study hours make as much progress in their studies as those who spend the whole six hours in recitations and poring over books. Boys educated under this plan are well adapted for college and business life. The school and school associations, with the better physical development from working, tend to make them hardy and self-reliant.

The mental strain is probably the hardest to adjust and not do an injustice to the weak or strong. It is known that severe mental strain from business and other worries frequently acts as an exciting cause of insanity. I am not alone when I claim that at least in some cases over-work in school prepares the soil, if it does not actually sow the seeds which eventually develop into insanity.

Our mission is as much to prevent as to cure disease. It is not the robust but physically weak children that we must protect and save by timely advice. Children with large, well-balanced brains, who have frail bodies and weak constitutions, or, with a hereditary tendency to insanity, should be guarded with special care. While they are usually bright and learn readily, they are frequently assigned to classes in which are other active brains, backed by strong constitutions, and perhaps by one, two, or three more years of age. With the limited time for outdoor exercise, and the strain and excitement of the work required to stand well in their classes, their usually delicate health is still further impaired, and not infrequently they are obliged to leave school on account of some nervous manifestation.

Sleep is often troubled by dreams of lessons and mental exercises. These children should be allowed to lie in bed and rest as long as possible. The morning nap is their best and most refreshing sleep.

One more portion of the text Superintendent Skinner has given us and I will close. There is no condition that the oculist is called upon to treat which has such far-reaching results as errors of refraction. There is certainly no condition demanding more time, painstaking care, skill, and experience, than in the fitting of proper glasses to correct these defects. Simply adjusting a pair of magnifying-glasses so that the child will see the print more distinctly does not mean that the error of refraction is properly corrected and the eye-strain relieved. While I would emphasize the importance of this question I fear it may be assumed that I am looking at the subject simply from the oculist's point of view. I shall therefore be very brief. In all cases of astigmatism or myopia, a careful ophthalmoscopic examination of the fundus of the eye should be made, and recorded, at intervals of one or two years. It is claimed that all myopic eyes are diseased eyes. I do not think this is true of the lower grades of myopia, but the least we can say is, that all cases of myopia should be watched, and if it is found to be progressive, then most, if not all, close work should be prohibited.

Children are not born myopic; it is an acquired condition. Full-blooded Indians and negroes are never myopic. It has been truly said, "Myopia is a product of civilization."

In our primary schools in the country districts we find about one per cent. of the children myopic, while the primary schools in the cities show a much larger per cent. As we reach the higher grades of grammar, high school, and college, the increase is most marked and the per cent. is out of all proportion to the advance in grade. A low degree of myopia without astigmatism does not cause headache or other subjective symptoms of eye-strain, but astigmatism of any form or degree is liable to set up a train of nervous symptoms.

The symptoms of eye-strain are variously described by different children. Frequently a sensation of fulness in and around the eyes is the only head symptom complained of for weeks. Other cases complain of itching or burning of the lids which may become reddened or scaly among the lashes. Letters or words often appear blurred or indistinct, and occasionally double vision is complained of. Blinking, a forerunner of other nervous trouble, may be noticed by the parents or teacher. Headache from eye-strain is so common that I will not take your time except to say that it is usually frontal or in the temple, one or both, and occasionally in aggravated cases may radiate to the occiput or base of the brain.

Dr. Crichton Brown investigated headache among school-children and found 46 per cent. suffering from this trouble in the city schools, while only 6.5 per cent. suffered from it in the schools of the country.

Prof. E. C. Seguin, who for a number of years has been recognized as an authority on diseases of the nervous system, has this to say in an article written for Keating's "Encyclopedia of the Diseases of Children":

"The ocular theory of megrim is supported by a remarkable series of facts, some of which have already been referred to. Another thing in its favor is that it is extremely rare to meet with normal eyes in victims of megrim. The great majority of subjects have hypermetropia, astigmatism, or the two combined, besides, in some cases, faulty muscular equilibrium. We are so deeply impressed with the importance of ocular strain as a prime factor in the genesis of megrim that we would strongly urge that in every case a thorough examination—*i.e.*, one made while the eyes are under the full influence of atropine—should be made of the refractive and muscular power of the eyes of patients suffering from megrim, and that too at the earliest possible age. Many adult cases are relieved or almost cured by correction of ocular defects, and we believe that if this treatment were applied more extensively to children, even before they began to have headaches, much suffering might be spared, and many cases of so-called neurasthenia or nervous exhaustion, supposed to be due to overwork in children and youths, might be prevented."

In conclusion I would make these suggestions for your consideration:

1st. Systematic inspection of the hygienic condition of schools by competent individuals or boards.

2d. School-rooms properly scrubbed and dusted.

3d. Individual cuspidors and drinking-cups.

4th. Adjustable seats and desks.

5th. Vertical penmanship.

6th. A suitable drying-room for wet wraps.

GERMS.

By W. K. Grayson, M.D.

Chemistry brings to light poisonous gases, the presence of which is confirmed by the sense of smell, but the use of the microscope makes a still more important discovery, namely, the presence of myriads of specks of life, to which the name of germs has been given. Wherever decomposition is taking place these organisms are present in untold numbers. It is perhaps a question as yet unsolved whether they are a product of decomposition or really its cause. To the former I myself, individually, hold, but one thing is absolutely certain, that they are never absent from any process of decay. Infinitely small in size, so small that unnumbered millions range, without restriction, in a single drop of water, yet they are more potent of harm to human life and health than all other agencies combined.

Undoubtedly these are the active agencies that give rise to yellow fever, diphtheria, dysentery, cholera, the plague, and to the terrible typhus fever, which annually carries off its thousands of victims in every part of the habitable globe, and also to a long list of diseases whose name is legion and whose exact number is yet unknown. There is as yet some difference of opinion among very eminent medical authorities as to the exact nature of the germs which give rise to different diseases, and as to the exact mode of their development and transmission, but it is certainly settled that decomposing matter furnishes a fertile soil for the development of the germ-causes of diseases mentioned and many others.

GERMS AND FOUL ODORS.

Noxious gases and disease germs are usually associated together; a fortunate fact, as it enables us to detect the dangerous character of an infected atmosphere without the trouble of a chemical analysis. It is possible for the air to be swarming with disease germs without an offensive odor being present, but it seldom happens that we have an odor of putrescence without the presence of noxious germs. It is perfectly safe to assume that a foul-smelling air is a dangerous one. If our eyes were microscopic we should daily and hourly behold sights that would appall the stoutest heart.

Perhaps we may with profit investigate briefly some of the most common sources of germs, these deadly enemies to the life of the human family. We need not seek long for an illustration of the source from which these unseen and invisible foes sally forth to prey upon our dearest friends and ourselves. Let us give a pen-picture of an average country home and many city habitations. We have a fine, commodious, and perhaps even an elegant dwelling; ample room, comforts of every description, every convenience that money can procure or ingenuity can invent. It would seem, then, that the occupants of such dwellings ought to enjoy the finest health—but alas ! they do not. Every once in a while the destroying angel, Death, makes his dread call on the household. He ruthlessly slays the father, mother, brother, sister, the strong man and the feeble babe. Why this cruel slaughter? Why this terrible sacrificial offering? Who are the invisible monsters invading these happy homes and family circles? In times of the far-off long ago it perhaps would have been surmised and said, "An evil spirit hath done this thing." But the days of superstition have passed and gone by. Consequently, we have to look for a rational solution of the mystery. We will start on a journey of investigation and discovery, and perchance we may be enlightened and enlighten others on this fearful subject. We begin with the cellar, the lowest portion of the house, and proceed to examine it. The sense of smell at once informs us that a quantity of decaying fruit or vegetables has accumulated there, having been undisturbed perhaps for months, and pouring forth into the air their death-dealing emanations, the effect of which has already been described. Through the open cellar-door, through the cracks in the floor, through the porous partitions, and through a thousand channels, this stagnant, poison-laden air finds its way to the living apartments of the household, and into the lungs of its occupants. Every corner and nook of the dwelling is infested and running over by that poisonous, disease-producing odor. So much for the cellar. Let us now take a peep into the kitchen. Here we find what everybody recognizes as kitchen smells. In one corner stands the old coal or wood box, the mute receptacle of a hundred things besides its daily supply of fuel. If the witness were not mute we might listen to a tale of insanitary transgression connected with that homely piece of furniture in the corner. Let us turn out upon the floor its contents and scrutinize them. Good heavens! what a smell. The nose makes emphatic protest with a sneeze, and we proceed with our examination. Decomposing apple-cores, odds and ends of every imaginable eatable, fish-bones, potato-peelings, mouldy and putrescent cabbage-leaves, a filthy conglomeration of everything perishable, redolent with filth and putrification and crawling vermin—such are the contents of the average wood-box. Next, in another corner, stands the sink, often made of wood, saturated with decomposing dish-water, hiding in its secret corners filth and old dish-rags in the last stages of decay; and the drain-pipe, connected with its bottom, affords an open channel for the ingress of pestilential odors from the cesspool just outside the door. The plastered wall, saturated with the accumulated filth of a quarter of a century, pouring forth a perfect stream of gaseous filth, which is unobserved only because overpowered by other sources of filthy contamination. Next we go to the pantry. What do we find? A pantry full of germs. Do you wonder if the Goddess of Health ever took a peep at a modern pantry? I do not. If she ever did it is a wonder that she did not send her messengers on a commission of punishment among the filthy cooks for such a vile infringement of her laws. Our olfactories are the only guide necessary to enable us to discover the whereabouts of the precious corner where are deposited the provisions for daily consumption by the family. An odor of sourness, which betrays unmistakably the presence of decomposing milk, leads us to the doorway of the pantry, and we enter to make a closer inspection. With the exception of a few pans of milk, which has lost its useful properties, and acquired some musty odor not perceptible, perhaps, except to those who have the sensitive olfactories of the trained sanitarian, our attention is next drawn to sundry drawers and corners which might have otherwise escaped notice. On an investigation of their hidden recesses we find fragments of mouldy bread, stale food of every kind and degree; often a churn, with its souring, fermenting contents, awaiting the weekly churning-day. These are but a few items which would be included in a complete inventory. It is a superb place for germs of every description to hold high carnival. And they do. We will now take a short inspection of the sitting-room of the house. Here we find again the inevitable wood-box, of course, nicely painted and lacquered, but no less uninviting than its twin brother of the kitchen. We find no kitchen sink, with its putrescent odors, but that source of contamination is within easy smelling distance, and so is able to put in its deadly work without stint or hindrance. So, too, the putrescent fumes from the cellar and pantry are plainly discernible, and the walls are covered with a layer of decomposible matter, condensed from the vapors from the kitchen arising from the cooking of vegetables, boiling of filthy and soiled linen and other garments, and other domestic and culinary operations. We would ask, Where could a more fertile field be found for the generation of germs? Echo answers, Where?

A dark spot a foot or so in diameter marks the place in the paper stained as the result of a defective roof. On a closer investigation we find something more than a stain; yes, a flourishing crop of mould. Put a speck of this same mould under the microscope and it brings to light a perfect forest. Every twig bears fine, large, round fruit, which consists of sacs filled with minute cells—spores. Some of these sacs are ripe and bursting, throwing the spores with which they are filled in every direction, and conveying to the occupants of the house the seeds of disease and death. The very carpet on the floor conceals beneath its delicate shades an accumulation of contributions from every source of impurity within the dwelling and without. Let the children romp about the room a few minutes and see what a cloud of witnesses arise to testify that the shadows of death are lurking beneath its graceful patterns. Next comes the parlor. Yes, an infected parlor. Here is the parlor, with its close, musty smell and its chilly dampness. An odor of sanctity pervades the place. It is sacred to use on great occasions, when its death-dealing walls are made to witness the still more deadly depredations of a so-called fashionable gathering. Upon its cold walls are condensed the steam finding its way from the kitchen and wash-room, and the organic filth carried with it. "What makes the walls of my parlor sweat so?" has been asked many times by housekeepers who were annoyed by the dampness of their parlor walls and ceiling, giving rise to mould and mildew. The explanation has already been given. God's sunshine never gets into the dwelling, or at most only a glimmer now and then. Its sacred walls are never profusely disinfected by the sun's full, warm rays. Thence, its air is constantly charged with death-dealing potencies and properties, which are ready to exhibit their dire potencies whenever a favorable opportunity occurs. It is unnecessary to carry on our investigations any further, for from garret to cellar, from sitting-room to parlor, from privy and backhouse, from the well and cistern, even to under the floors, the like filthy and unwholesome insanitary conditions prevail, and it is high time that the laity should begin to understand these subjects, and steps be taken by the householder to remove these most fatal causes of mortality. "But what do you know about these germs you talk so much about?" says one. "Is this not all hypothesis?" We answer: The connection of germs with the phenomena of decay and disease is something more than an hypothesis. A germ is not a hypothetical thing, like the ether of physical science. Germs have been seen and studied by the aid of powerful microscopes with the greatest care. Their species, mode of development, favorite habitats and conditions essential to their existence have been worked out with almost as much completeness as the same points with reference to our higher plants and animals.—*Texas Med. News.*

A PLEA FOR MODERATION IN OUR STATEMENT REGARDING THE CONTAGIOUSNESS OF PULMONARY CONSUMPTION.*

By Vincent Y. Bowditch, M.D.,

ASSISTANT IN CLINICAL MEDICINE AT THE HARVARD MEDICAL SCHOOL; ASSISTANT VISITING PHYSICIAN AT THE BOSTON CITY HOSPITAL.

Gentlemen of the American Climatological Association: Recent events in Boston have impelled me to say a few words to you at our annual meeting with the hope that by discussion of the subject we may have some influence directly or indirectly upon the community, especially the laity, in checking what has of late frequently seemed unnecessary alarm about the contagiousness of tubercular disease, especially in its pulmonary form.

In what I am about to say I trust that I shall neither seem to disparage the great advance in medical knowledge due to bacteriology nor to discourage in any way all reasonable efforts to prevent the spread of tuberculosis. I firmly believe that in another generation we shall see a diminution in the general death-rate from this disease, largely due to the precautions which are now so earnestly advocated by the mass of the profession. I only wish to protest against the unreasonable and often, as I deem it, cruel attitude taken by the laity, and even by physicians, in their desire to prevent the spread of the disease.

Not many weeks ago the people in Boston were treated in their local papers to hot discussions which have been carried on at the City Hall relative to the proposed enlargement of a certain institution in the suburbs for the shelter of poor consumptives.

I have been surprised and even shocked to read the statements of some medical men at these hearings, to say nothing of the extravagant words of members of the laity—mostly composed of people living near the institution—who in their desire to rid themselves of what seemed to them an objectionable neighbor, have given vent to most unwarrantable statements, which serve to give the public an unnecessary alarm and create that state of constant apprehension which I firmly believe is a potent factor in producing disease.

The only excuse that I can conceive of for the marked opposition to this special institution is that at one time it was not conducted as a well-regulated hospital for consumptives should be, and that before we knew the importance of destroying the chief source of infection, namely, the sputa, patients were allowed to expectorate upon the grounds about the building, a method which, I have lately been told by one of the trustees, has been absolutely prohibited on pain of dismissal at the first offence.

Not long after these statements had appeared in the papers I was asked by a layman my opinion upon the subject of the contagiousness of consumption. I told him that doubtless it was a contagious disease under certain conditions, but that with certain precautions, chiefly in the strict care of the sputa, the dangers of contagion were reduced to a minimum. It then came to light that he was one of the opponents of the institution about which such a controversy had occurred, and he almost angrily turned to me and said: "It is abominable that such hospitals should be allowed anywhere in our midst. They are a source of danger to all!"

The gentleman seemed to be oblivious of the fact that these consumptive patients confined in the walls or in the grounds of the institution were an infinitely less source of danger than if allowed to roam at large, spitting in the street-cars, public places, or even in their own homes. His position represents that of thousands who hold the same unreasonable views, and who in their fear of contagion forget the sympathy and kindness due to those who are suffering from consumption; and for these views, the extravagant or careless statements, I regret to say, of our own profession are largely to blame.

---

* Prepared for the Annual Meeting of the American Climatological Association at Lakewood, N. J., May 13, 1896.—*Boston Med. and Surg. Journ.*

When a physician asserts that consumption is "as contagious as small-pox," and that "hospitals for consumptives are a source of danger to the whole surrounding community," I consider him culpable for making perfectly unwarrantable statements that cannot be borne out by facts.

It has been proved by observation in the communities near two of the largest sanitaria for consumptives in the world, namely, Görbersdorf in Silesia and Falkenstein near Frankfort, that consumption has lessened in amount among the entire population since the introduction of the sanitaria there, largely due, it can justly be said, to the strict hygienic rules which are used at the sanitaria for the disposition of sputa, and which are taught to the inhabitants in the surrounding villages.[*]

It is doubtless perfectly true, on the other hand, that in various "open resorts" for consumptives where strict methods for disinfection of the hotels and boarding-houses are not enforced, the death-rate among the natives from consumption has increased greatly, the most striking cases being those of Mentone and Nice, where, according to statistics, consumption has greatly increased since the place has become such a common resort for phthisical patients, many of whom, through carelessness or ignorance, become sources of contagion to others.[†]

Whether this increase of consumption among the natives is due to the lack of strict hygienic rules among the hotels and boarding-houses for phthisical patients in Nice and Mentone, or because the native population have changed their former out-of-door occupations to the more confined life of hotel attendants, may be justly questioned, and yet the difference between the experiences at Mentone and at the two great sanitaria just mentioned is very striking.

In a very interesting paper entitled "A Study of the Infectiousness of the Dust in the Adirondack Cottage Sanitarium,"[*] Dr. Irwin W. Hance has given some results which prove how little danger there is of infection in properly regulated institutions.

Guinea-pigs were inoculated with the dust taken from various rooms of the sanitarium, and tuberculosis was found to be present only in the animals who had been inoculated with the dust from the room of a careless patient who had been complained of for spitting on the floor, a striking example of the absolute necessity of cleanliness in this particular.

In the large hospital for consumptives at Brompton, London, where the same strict hygienic rules are maintained as at the great sanitaria of Germany, the percentage of hospital attendants who have developed phthisis is very small indeed, according to the statements of Dr. C. T. Williams.

Directly bearing upon the subject in question are the scientific and very important experiments of Delepine and Ransome with reference to the germicidal effects of various substances upon the bacilli of tuberculosis. In these experiments exposure to the full rays of the sun for a comparatively short time (a few hours) proved the most efficient germicide of all, it being sufficient to render the bacilli completely inert, the inoculated animals showing no signs of tuberculosis. The experiments were made, it is important to state, with dried sputa, and not with simple cultures of the bacillus.

They found, moreover, that the 1 to 10 or 1 to 100 solution of chlorinated lime proved to be the most efficient method of disinfecting the clothing, the walls, and floors upon which the sputa had been expectorated.

Since the publication of Ransome's paper I have been rather surprised that no other bacteriologists have experimented in this special direction, or at least that I have been unable to find published accounts of such experiments. A. K. Stone and others have proved the extreme vitality of the bacilli when not exposed to the sun—sputa dried for three years in a dark place having produced tuberculosis in animals; but we need the results of more extensive experiments in the direction Ransome has taken, the importance of which in the practical every-day dealing with consumptive patients can hardly be overestimated.

---

[*] Römpler: Beiträge zur Lehre von der chronischen Lungenschwindsucht.

[†] Bennett: On the Contagion of Phthisis Pulmonalis.

S. A. Knopf: Letter from Dr. Balestre, quoted in *Les Sanitaria*, Traitement et Prophylaxie de la Phthisis Pulmonaire, p. 173.

[*] *New York Medical Record*, December 28, 1895.

As a result of the experiments of Ransome, it is certainly a legitimate doubt to come to our minds as to how far we need fear infection from sputa which are expectorated onto the open ground exposed to the full rays of sunlight. Not that I would relax one iota in the restriction of the disgusting habit (to say the least) of spitting publicly anywhere; it is only a question as to its danger under the condition of exposure to the sun's rays.

Thus we have scientific facts to help us in trying to show the laity that the consumptive need not be treated like a leper, or as one affected with the plague, but that moderate measures will prevent his being a source of danger to those about him.

It is doubtless natural that the ordinary hotel-keeper should prefer not to receive a guest far advanced in consumption for reasons other than fear of infection; but I have seen too much of the sadness arising from the fairly brutal disregard of the poor sufferer's feelings in some cases not to make me wish to beg for moderation in our statements to the laity, lest we be guilty not only of making assertions not based on scientific truth, but also of adding unnecessarily to the mental suffering of those who are already overburdened with physical ills.

I can never forget the pathos of a former consumptive patient of mine, now dead, as he told me of his experience once in an Adirondack hotel, the proprietor of which came to him and told him that he must leave, when feeling forlorn and ill, "because he had a cough," and this instance is but one of many, as almost any specialist for chest diseases can testify.

In conclusion let me emphasize my own position in this matter, lest by any chance I should be misunderstood as wishing to relax in methods for perfect cleanliness about the consumptive patient. I advocate most firmly the destruction of the sputa by fire or other methods of disinfection. I believe also that the rooms occupied by a consumptive patient should be thoroughly cleansed with chlorinated lime or carbolic acid; in short, that all reasonable methods should be adopted to kill the germs of the disease, but I wish to refute the statements that *properly regulated* consumptive hospitals are sources of danger to the community when I believe them to be exactly the opposite, as shown by statistics. I wish also to plead for the consumptive who in his exile is made to feel the forlornness of his condition still more keenly by the selfishness of those who, in their desire to escape the possibility of infection, shut their doors in his face, as it were, utterly regardless of the mental suffering they are inflicting.

Future experimentation will doubtless throw more light upon the subject; but meanwhile let us in our zeal as physicians be careful not to make statements which we may be obliged later on to retract as not being founded upon scientific truths.

EXCESSIVE USE OF DRUGS IN ACUTE FEBRILE INFECTIONS.*

By A. C. Harrison, M.D.,
MEYERSDALE, PA.

Mr. President and Gentlemen: I have nothing new to offer, and all that I shall say in this brief paper has probably been better said many times before, but the habitual use of many drugs in this class of disease seems so generally indulged in, that the repetition of this subject may not be out of place here.

The average physician gives drugs when he is called to a case, because they are recommended and he is in the habit of giving them. If the case is a severe and long one, he is very apt to run through the entire list of drugs and combinations that are recommended, by what he considers good authority. He gives drugs, not for the special purpose of producing a given effect, but because the patient has a given disease.

---

* Read before the Tri-State Medical Association at its annual meeting, held at Cumberland, Md., June 4, 1896.—*Maryland Med. Journ.*

As the knowledge of internal medicine advances and diagnosis becomes more exact and clear, the tendency among the best practitioners of the day is to simplify the prescription, and lessen the number of drugs given. To this extent, if no further, the recent discoveries in the causation and pathological course of disease have been potent for good. Every step forward in the knowledge of the exact cause of disease and its workings in the human body culls out some of the manifold drugs and methods which have been used in curing the sick.

Many times, too, these culls have been much lauded, but even after being demonstrated to be useless rubbish, they leave the field slowly, and stop to argue with each straggler they meet. In the mind of the average man, too much is expected from drugs, and not enough reliance is placed in nature. This is not to be wondered at, for many reasons, but chief among them are two:

1. A student is taught from the professor's chair, and by almost all authorities, that the giving of certain drugs is the correct and main thing to be looked after, and that cures are to be expected therefrom.

2. The diseases of this class are all self-limited, and strongly inclined to recovery. No matter how bad the treatment, a goodly number will recover. When a certain drug or combination of them is exhibited in a given case, and it recovers, it is not unnatural to conclude that the drug influenced the disease for good, but this conclusion is by no means necessarily correct.

If we look up the drugs used by various authorities, we find them as various as the authorities referred to, and the results practically the same. Now and then some bold fellow looms up in the field and advocates the use of no drugs at all and claims as good results as any.

The difference in the malignancy in epidemics and in different cases in the same epidemic are so great that it is extremely difficult to determine the value of any drug or method in the treatment of disease. All of us have treated a number of cases, at times, with a certain drug or combination, and found the results so uniformly good that we have concluded that this was the ideal method, and have congratulated ourselves that at last we had a method upon which we could depend to cure this or that disease, but it is usually not long before we have another epidemic, or series of cases, in which our pet entirely fails us and results are now as bad as they were formerly good.

The unavoidable conclusion is that the drug was successful when it was not needed, and impotent when it was.

It is marvellous to note what an amount of disease and drugs the human system will sometimes stand. I have seen, for example, a four-year-old child take the following drugs for diphtheria involving the larynx: Whiskey, two drachms, every two or three hours, for its stimulating effect; calomel, three grains, ipecac one grain, every three hours, and fifteen minims of the fluid extract of jaborandi, every four hours, to loosen the membrane. A cough syrup containing tar, wild cherry, ammonium chloride, paregoric and quantities of syrup, for the accompanying bronchitis; with one grain of quinine and six minims of iron chloride, three times daily, as a tonic, and an occasional dose of alum as an emetic.

As local applications there was turpentine bound to the neck, and the throat swabbed every few hours with a mixture containing chloral hydrate, carbolic acid and glycerine, of which there must have been a considerable quantity to enter the stomach. No part of this treatment lacks good authority, and in the absence of antitoxine and intubation is probably as good as the average.

But suppose that we analyze the drug treatment given this case; we find that there are just nineteen drugs, all more or less powerful. and many of them very toxic, being liberally poured into this four-year-old stomach. Whiskey, calomel, ipecac, jaborandi, turpentine, tar, wild cherry, ammonium chloride, opium, benzoic acid, camphor, anise, alcohol, alum, quinine, iron, chloral hydrate, carbolic acid, and glycerine.

Can it be possible that this combination accomplished any good in this case? Is it not far more likely that it did much harm? And yet this little fellow recovered, and I have no doubt but that the attending physician numbers this among the patients that he has saved from a miserable death by the use of drugs.

You have all seen these poor little sufferers, already enduring the tortures of the damned, and bearing the additional torture of the swab and endless drugs. If it were not criminal, almost, even to think of such a thing, would it not be interesting to observe how long a child could withstand this amount of drugging without any disease?

The use of antitoxin is to be commended, if for no better reason than that it does away with many of the more pernicious drugs ordinarily used. I am by no means prepared to say that serum-therapy in diphtheria has no specific effect, for I have had little or no experience in its use, but from a study of the literature on the subject, there seems to be much reason for believing that a line of treatment still less harmful would accomplish even better results.

Another familiar picture to you all is the dreadfully sick man who has passed through long weeks of terrific fever, during which time we have used drugs liberally, at last sink so low and become so weak that recovery seems well-nigh impossible and further medication useless. We say to the attendant, give him a little brandy occasionally and, if he rallies sufficiently, a little nourishment. At last we abandon drugs and turn to nature as a forlorn hope. Sometimes he does rally, after many hours or many days, and slowly recovers. While he had strength, and his resistive powers were good, drugs were powerless to cure, or even to check the disease. But nature keeps the vital spark alive till the fever has run its course and worn itself out, then from the ruins rebuilds the structure. We claim the credit, however, and sometimes we get it. The wonderful endurance of nature is the bank from which the internal medicine-man filches his reputation.

Without going into the discussion of the exact cause and pathology of pyrexia, it may be said that any drug, administered internally, which reduces temperature, except by elimination (mechanical, as purging or otherwise) or neutralization of the ptomaines or other germ products, which are the direct causes of the febrile movement, does so at the expense of some of the vital forces and the good effect is, as a rule, far more than overbalanced by the vital depression caused in producing it. It is now practically admitted by most good authorities that all the so-called antipyretic drugs are worse than useless in continued fevers and they should be abandoned in so far as this condition is concerned.

There are certain general principles to be carried out, but as to how best execute them is a matter about which many good opinions are much at variance; but in general it may be said that the best treatment for acute febrile infections is good hygiene, a proper diet, a clean alimentary canal, the abstraction of heat by external means, and a good doctor.

PREVENTION OF INFECTIOUS DISEASES.

At the Atlanta meeting of the American Medical Association, a paper by Dr. J. M. G. Carter, of Waukegan, Illinois, on the "Prevention of Infectious Diseases" was presented before the Section on State Medicine. The writer holds that the use of antitoxins and other means in the hands of physicians are not sufficient. Some radical means should be adopted which will prevent the origination of these diseases. It is well to be able to check their spreading and becoming epidemic, but it is more desirable to prevent the diseases than to check their spreading.

One of the most necessary measures in the author's opinion is a radical change in the method of dealing with the poor. The virulence of these poisons is destroyed by sufficient air or water dilution; hence some relief of the overcrowded, dirty, homes of many quarters of our cities and towns is absolutely essential to prevent the origination of infectious diseases.

The paper concludes with the following *résumé*:

1. Systematic cleanliness should be practised (*a*) by thorough disinfection of the patient, the sick-room, all instruments, vessels, and other apparatus, or clothing in use; (*b*) by allowing no unclean or infected fabric or vessel to be taken from the room until rendered aseptic.
2. Prevent individual contact (*a*) by isolation, segregation, or quarantine; (*b*) by prohibiting communication between the infected and uninfected, except under strict surveillance of the physician or in accordance with his explicit directions.
3. Provide thorough and systematic ventilation of cellars and basements, as well as all other rooms, in houses used for dwellings, and give free access of air under floors of houses which have no cellars or basements. supply thorough drainage.
4. Fortify the system against pathogenic bacteria (*a*) by abundant and suitable nourishment; (*b*) by insisting upon the observance of the laws of hygiene relating to clothing, eating, exercise, and bathing; (*c*) by the administration of certain drugs, among which belladonna, iron, and pilocarpine are prominent; (*d*) the judicious use of vaccination, inoculation, the serums, or antitoxins, and perhaps protonuclein.
5. The State or city should see that the poor have proper work, food, clothing, shelter, public baths, and fresh air.
6. Health officials should keep their wards in good sanitary condition, and see that the water and food supplies are uncontaminated.

THE CRAVING FOR SALT.

In the *Lancet* for June 6 the Paris correspondent writes that this subject was discussed at a recent meeting of the Société de Biologie. M. Lapicque stated that sodium chloride was consumed as an article of necessity by nearly all races, and that most of the lower animals were fond of it, although there were exceptions to the rule. The herbivora betrayed a greater liking for the salt than the carnivora, and in the same way agricultural populations, who were more or less vegetarians, were invariably large consumers of it. The tribes who ate no salt led a pastoral or nomadic existence, whose regimen was almost exclusively animal. This, said the writer, had led Bunge to formulate the theory that as vegetables contained principally potassium salts, these latter replaced the sodium salts in the economy, and the vegetarian instinctively craved for common salt in order to compensate for its loss through the kidneys. This theory was, however, weak, for it did not explain why certain peoples who had not access to sea salt replaced it by salts of potassium obtained by the incineration of plants. Such a people were the negro inhabitants (a million) of the French Congo between Lake Sangha and Lake Tchad. Salt was unknown in this vast territory, which was as large as France; for it was substituted an artificial salt extracted from a certain number of selected plants, whose ashes were washed and their potassium salts crystallized out. Samples of the salt had been analyzed and found to be composed of potassium salts only. When on their first entrance into the country the French had endeavored to sell common salt they found it unsalable, the natives preferring their own. This disposed of the theory propounded by Bunge, and, the writer thought, weakened another theory advanced by Ringer and others, who maintained that potassium salts had the property of a protoplasmic poison and cardiac depressant. M. Lapicque inclined to the belief that salt was of use only in procuring for man and animals a gustatory stimulus. M. Trouessart stated that dearth of salt in besieged cities had been made up by the use of saltpetre. M. Giard told his colleagues the story of the chimpanzee of the London Zoölogical Gardens which, deprived of salt, had taken to drinking its own urine. As soon as it had been provided with a block of bay salt it had ceased to drink its urine and used to sleep with the salt held tightly in its arms. According to M. Samson, oxen and sheep would, on large farms, abstain for weeks together from the salt placed within their reach, whereas at certain other periods they ate largely of it. This variability of appetite for salt was due to the variation, according to the season of the year, of their diet.—*N. Y. Med Journ.*

ICE-CREAM.

THE British Institute of Preventive Medicine has dealt a deadly blow to ice-cream. A very exhaustive inquiry regarding the nature and adulterations of this toothsome substance has just been completed by Dr. MacFadyen and Mr. Collyer, F.I.C. These gentlemen tell us that ice-cream has only 26.5 per cent. of solids, the rest being water; that the solids consist of fats, four per cent.; sugar, twelve per cent.; starch, six per cent.; albuminoids, four per cent.; and mineral matter, one-half per cent. This all sounds well enough, and would lead the unwary reader to think that ice-cream was all right, but the *dénouement* comes in the results of microscopical research. The microscope shows the presence, in London ice-cream at least, of bedbugs, bugs' legs, fleas, straw, hair, coal-dust, woollen and linen fibre, tobacco, epithelial scales, and muscular tissue. Even the microscopical examination, however, is delectable compared with the results of bacteriological studies. These reveal in street-barrow ice-cream a maximum number of seven million microbes per cubic centimetre, while the ice-cream of the shops has only one million per cubic centimetre. The character of the micro-organisms is extremely mixed. There are the bacteria coli commune, besides spirillæ and putrefactive microbes of various kinds. We find no account of a chemical analysis, which would perhaps add the final touch to the pathological picture of the ice-cream of the shops. In this country it is known that ice-creams chemically contain a poison known as tyrotoxicon. But in London, it seems, what with the bugs and the microbes and the filth generally, there is no particular need of further research to prove that the ice-creams of the pedlers and the streets are not good things to eat. It would be a manifest injustice to the ice-cream industry, however, to suppose that the supply which is furnished to the American public is at all comparable to that which has been investigated by the English authorities.—*Med. Record.*

MIND CURE.

THE wise practitioner may not ignore a fact even though its existence does not harmonize with his preconceptions. The existence of a fact is not established through any process of reasoning, but rather through the evidences furnished by the senses. That mind influences matter, and that the functions are affected by mental conditions no observant physician longer attempts to gainsay. These facts have been laid hold of by ignorant, unscrupulous, or credulous persons, who have distorted them to the building up of "systems of practice," and as a result we have your Christian scientists, faith curers, high affirmationists, *et id genus omne*, who seek to beguile the unwary.

It by no means argues in favor of these latter-day fads to recognize the importance of the legitimate employment of the mind as a medium through which the body and its functions may be influenced. The mentality of the physician and the mental condition of his patient are potent factors in the determination of the outcome of the physical disturbance known as disease. To an extent every successful physician practises the so-called mind cure in every case coming under his care. His patient is not a test-tube in which definite results follow the use of definite reagents. The quack works cures where the scientific physician has failed, because he has aroused the mental condition of expectancy in his patient. He promises cure and the patient expects it. In the one case it has been the diagnosis of despair, and in the other hope has been aroused. The physician who walks up to the bedside with the long-drawn face, on which are written woe and despair, and whose funereal tones announce that death is hovering near, loses his patient, even before the grim destroyer seizes him, while he whose face is radiant and whose tones promise recovery retains the case, and often bv thus uniting the tonic action of hope with the *vis medicatrix naturæ* does good when the scientific prescription has failed. How often has it been said of the old and tried physician, who scatters sunshine as he goes, "It makes me feel better to have him step into the room."

Is this mind cure? What matters it what name we give it! Although it may not be tangible it affects the mechanism for good as perceptibly often as the zephyrs sway the leaves of the forest.—*Charlotte Med. Jour.*

DIETETICS.

THE influence of a wisely selected diet in maintaining health and restoring bodily integrity in disease is little understood by the laity, and even physicians give the subject but summary attention. A judicious dietary based upon a thorough knowledge of physiological chemistry and the needs of each particular case should accompany each prescription as a most important part of the treatment. Do not tell a patient his diet should consist of proteids chiefly, or be mainly carbonaceous, or that fats are what he needs. Specify.

Nitrogenous foods, comprising meats, milk, eggs, etc, are the most valuable, especially in chronic diseases, because of their widespread utility. They repair bodily waste, yield heat, energy, muscular and glandular activity.

The carbohydrates, comprising the sugars and starches, as milk-sugar, cane-sugar, grape-sugar, beet-sugar, seeds, roots, and tubers, etc., yield chiefly heat and energy. Carbohydrates should predominate in the diet of children and those who engage in outdoor pursuits. In childhood, the nitrogenous principles are utilized in repairing waste and developing the organism, while the excess of carbonaceous matter furnishes force for the incessant activity of this period. To deny children the sweets which nature craves is a physiological mistake.

Fats are exceedingly valuable They protect the body, prevent friction, retain animal heat and conserve tissue waste by furnishing the body with force and nutriment during a siege of disease. Pure butter and cream are the most digestible forms of fat and should be eaten largely during the cold seasons.

Green vegetables and fruits are useful chiefly for the acids and inorganic salts they contain and for their stimulant action upon digestion.

A deficiency of inorganic salts predisposes the tissues to break down easily. In diseases characterized by organic waste, purulent discharges, etc., there is usually a lack of some one of the inorganic tissue constituents.

The problem of dietetics is always an individual one, which must be carefully worked by the attending physician. The above suggestions merely embody general principles.—*Med. Brief.*

THE BLESSINGS OF "UNSEASONABLE" WEATHER.

WHENEVER the temperature during any of the winter months rises to an endurable height and it is possible for one to go out-of-doors without acute suffering, we always hear prognostications of sickness and death which are sure to result from a green Christmas and an open winter. But the truth is, it is the "good old-fashioned winter," the "seasonable temperature," that kills. The incorrectness of the popular idea is well shown by the vital statistics for the first quarters of 1895 and 1896 in England and Wales, which we find summarized in the *British Medical Journal* of May 16. These two periods of time "formed a great contrast in so far as the general temperature of the air was concerned. In the former year the mean temperature of the three months was 35.2° F., which was 3.7° F. below the average, while in February it was no less than 9.9° F. below the mean of that month. In 1896 the temperature of the three months was 42.3° F., or 3.4° F. above the average. The public health fully reflected these noteworthy differences in temperature. In 1895 the deaths in the first quarter amounted to 170,501, and the death-rate was 22.8 or 1.1 above the average. In 1896 the deaths in the corresponding period numbered 136,809, and were in the proportion of 17.9 deaths annually per 1000 persons living, which rate was 3.9 below the average. The increased mortality in 1895 was chiefly among persons aged sixty years and upward, of whom 60,454 died, giving a death-rate among such persons of 10.90, or 15.4 in excess of the mean. In 1896, 39,208 persons aged sixty and upward died in January, February, and March, and the death-rate was 69.2, no less than 26.2 below the average."

These statistics furnish fresh evidence of the killing-power of frost and of the beneficent influence of a mild temperature. But popular beliefs are not to be overthrown by statistics, and if we are blessed next winter by a mild atmosphere and absence of snow there will be plenty of physicians whose surprise will be equalled only by their disappointment that there is not more for them to do.—*Med. Record.*

ARTIFICIAL BREATHING.

Dr. O'Dwyer has devised a remarkable apparatus for producing and maintaining artificial respiration. It has been successfully tried in several of the hospitals and elsewhere in the case of morphine poisoning. In one case the patient was restored to life after having taken twelve grains of the drug. When brought to the hospital he lay in a stupor. His body had the blue appearance characteristic of morphine poisoning. The pulse registered 150 beats a minute; the breathing was feeble, only four respirations a minute being recorded. The apparatus consists of a bellows operated by the feet, a rubber tubing, and a metal tube with a cone-like attachment. This is placed in the throat; by operating the bellows air can be forced in the lungs. Valves are so arranged that natural breathing is simulated. In the case above referred to the tube was inserted at 10.30 P.M.; respirations were forced into the man's lungs at the rate of twelve per minute. The stomach-pump was also used, and the stomach thoroughly washed out, after which medicine was administered. At 11.30 P.M. the patient was aroused, but his pulse was not good. At midnight he became restless, the tube was removed, and he was made to sit up. In spite of all efforts to keep him awake, in about ten minutes his face and hands began to grow blue; his pulse was rapid and feeble. The tube was replaced, when his condition immediately changed for the better. At 2.30 A.M. the tube was again removed, when the bad symptoms returned. It was again placed in position and respiration maintained until 5.30 in the morning, when the patient became so restless that its removal was necessitated. After this, until 7 o'clock, the patient was kept awake by slapping with a towel. At 7.45 his respiration was sixteen to the minute, his pulse 120. In all, the tube had remained in use and respiration had been maintained for seven hours and fifteen minutes, during which time the patient was quite unable to do his own breathing. Other notable cases have been reported.—*Pop. Science News.*

Department of Physical Education.

WITH SPECIAL REGARD TO THE SYMMETRICAL DEVELOPMENT OF THE BODY.

Edited by J. CLARK SLAY, M.D.

(NEW YORK.)

PHYSICAL EDUCATION OF GIRLS.

IN the physical education of children it is not sufficient to consult merely their present ease and well-being, but attention is equally due to whatever is calculated to promote the vigor and usefulness of their future lives by strengthening their systems, preserving their bodies in the free exercise of all their movements, and thus protecting them from the deleterious influences of those agents by which they are constantly surrounded.

Throughout the whole animal kingdom the young are prompted by an instinctive impulse to almost constant exercise. Conformable to this imitation of nature, the infancy or childhood of man should be passed in those harmless gambols which exercise the limbs without requiring any minute direction from the head or the constant guidance of the nurse.

It is well known to physicians that when attempts are made in early youth to interfere with the natural movements and exercises of the body; when, from a false idea of improving the shape or giving grace to the carriage, children are confined to any particular position for a long period, they become restless and their muscles are apt to acquire habits of involuntary motion. Twitching of the features, gesticulations of the limbs, and even grave and permanent deformities may result from such unnatural restraint.

From exercise and the free use of pure air no child should be debarred. Upon these depend in a great measure the health, strength, and cheerfulness of youth, while they contribute essentially to the permanence of the same blessings during adult life. Error in this respect, it is true, is of occasional occurrence in the physical education of boys, but how often has an over-anxiety for delicacy of complexion in a daughter, or the apprehension that she may become coarse and ungraceful, been the means of debarring her from the enjoyment of either air or exercise to an extent sufficient to insure health and strength!

The bodily exercises of the two sexes ought, in fact, to be the same. As it is important to secure to both all the corporeal advantages which nature has formed them to enjoy, both should be permitted, without control, to partake of the same rational means of insuring a continued flow of health and cheerfulness to enable their systems to perform perfectly all the functions of life. Girls should not be confined to sedentary life within the precincts of the nursery, or at best be permitted a short walk, veiled and defended from every gleam of sunshine and from every breath of air. The unconstrained enjoyment of their limbs and muscles in the open air, without impediments to restrain the freedom of their movements, or an ever-watchful eye to curb the lively joy of their unclouded spirits, is equally important to their health and well-being as to that of their brothers.

The hope of securing a healthy, symmetrical developed body for a girl, with graceful form and movements by confinement, lack of sun and exercise, is about as rational as would be the attempt to improve the beauty and vigor of our forest trees by transferring them to the green-house and extending their branches along an artificial framework.

The first occupation of the day for children should be abroad for the benefit of inhaling the morning air. Every person who notices the fact will be struck with the difference in the health and freshness of complexion and cheerfulness of feature exhibited by the child who has spent some time in outdoor exercise before its morning meal and task and the one who passes immediately from its couch to the breakfast-table and thence to study. Children are generally fond of early rising when their natural activity of disposition has not been restricted.

As much of the day should be passed in the open air as the weather will permit and is compatible with those necessary vocations which call for attendance within doors. Nor are we inclined to limit this outdoor exercise in respect to girls to the season of summer alone. Though girl children, as generally educated, may not be able to bear the extremes of heat and cold as well as boys, yet by proper management they may be enabled to sustain with as little inconvenience the transitions of the seasons. A habitual use of the cold bath, when no circumstances are present to forbid its employment, while it contributes to the health of the system generally, is an effectual means of removing that delicacy of constitution which renders an exposure to cold alike disagreeable and prejudicial.

THE VALUE OF RESPIRATORY GYMNASTICS IN MAINTAINING THE INTEGRITY OF THE LUNGS, AND AS AN AID IN THE TREATMENT OF DISEASES OF THESE ORGANS.*

By Edward O. Otis, M.D.,
BOSTON,
Medical Director of the Young Men's Christian Union Gymnasium; Visiting Physician to the Free Home for Consumptives.

In the differentiation of medical work and the minute attention which is accorded to each organ of the body, the function of respiration seems, in a measure at least, to have escaped the careful attention granted the other vital processes. One consults his physician and is interrogated by him to see, for example, if his kidneys are acting properly or his heart is in order; if his digestion is well performed and his diet correct, or his hepatic secretion normal; but frequently neither thinks to ask if the breathing is adequately performed—a function which is of such vital importance, not only for the integrity of the pulmonary tissue itself, but for the well-being and health of the whole body. Upon the efficient performance of this act, we know, depends largely the condition of the circulation, assimilation, and excretion, as well as the process of combustion, the greater or less completeness of which depending also upon the greater or less perfection of the respiratory act. And further, so far as the lung tissue itself is concerned, it responds very delicately to the manner in which it is used or disused. Full and free respiration of pure air strengthens the pulmonary tissue and nourishes it with well-oxygenated blood; its vitality is increased in direct proportion to its work, exactly as is the case in muscular activity; the resisting force of the lung tissue is also increased. On the contrary, inadequate and partial respiration, such as so many persons of sedentary habits and indoor occupations are accustomed to, throws into disuse more or less of the lung tissue and reduces to a minimum the respiratory function. In consequence of this the nutrition becomes defective and the tissue weakened, becoming an inviting soil to disease and the bacillus. The deprivation of the pulmonary exercise furnished by the articulation of words is said to be the cause of the frequency of pulmonary tuberculosis among deaf-mutes, and I can readily believe it. Among the inmates of the Consumptives' Home almost all, with the exception of teamsters, were of indoor occupations, which meant, as a rule, insufficient respiration.

"There is no apparatus," says Lagrange,* "where we can verify in a more striking manner the law that 'action makes the organ' than in the respiratory; no organ is so rapidly modified as the lung in accommodating itself to the more active working which is demanded of it. We all know that it is the apices of the lungs which offer the least resistance to the invasion of the tubercle bacillus, because they are the portions of the organ which remain habitually inactive in the inadequate breathing of sedentary life. Time and again have I heard the click or râle at the apices of the lungs on full inspiration in examining candidates for the gymnasium, which indicated that this portion of the organ was ordinarily inactive, and never have I detected it when the person has been in the habit of taking deep inspirations.

---

* Read before the Boston Society for Medical Improvement, February 10, 1896, and printed in *Boston Med. and Surg. Jour.*

* Dr. Fernand Lagrange: La Médication par l'Exercice, Paris, 1894.

This question of proper respiration becomes one of exceeding and especial importance to the person of sedentary habits and occupation, which is the condition perforce of a large proportion of our city population. The little round of the city dweller's life is one of limited movement and slight bodily activity. A short walk frequently comprises all the exercise he takes, and even this is often "more honored in the breach than in the observance." The modern elevator, even, is often a curse in disguise, for walking upstairs, which Sir Andrew Clark was so fond of prescribing for his patients, is, I believe, an excellent form of exercise as well for the respiration as the heart. Indeed, when one reflects upon it he will be struck with the similarity of the life and its results of the sedentary individual, who takes little or no exercise and eats and perhaps drinks too much and the stall-fed ox or the *pâté de foie* goose; in both cases over-feeding and inactivity are the causes which lead to fat deposition and infiltration of the organs with a continual surplus of the products of incomplete combustion. Now the lungs suffer from this abnormal life quite as much as the liver and other organs; the lung tissue is only partially and inadequately brought into play and, consequently, poorly nourished. The supplementary respiratory muscles are rarely or never called upon to do their important part in the act of respiration, and, in consequence, they atrophy and become incapable of action, like any other disused muscle of the body. As time goes on the portion of the lungs which takes part in respiration becomes more and more reduced, and a large number of pulmonary vesicles become inactive. Whenever such a person is called upon to undergo any unusual exertion, like ascending several flights of stairs, climbing a mountain or riding a bicyle, he finds his breathing embarrassed, he suffers from a "thirst for air," for the air-cells in use cannot furnish the necessary oxygen. On the contrary, if he is in the habit of taking such exercise as calls into play the reserved pulmonary vesicles, then these cells are always ready to perform their function whenever any unusual exertion is demanded. And further, even in a state of repose these so-called reserved cells take part in respiration; one's "ordinary" lung capacity is large, as I have frequently proved by the spirometer; the respiration is slower and fuller, and finally this fuller respiration, introducing a larger amount of oxygen, produces a better hematosis and increases the general activity of the organic functions.

Now good breathing came naturally to man in his original state, for he was intended to be an active animal—to run and climb, to bend and twist his body, to stretch and extend his arms and, in brief, use all his muscles; and as long as he followed nature in this respect his lungs had full play and the respiratory muscles were maintained in a state of efficiency. So-called civilization, or at least city civilization, has so modified all this that one's life has resolved itself into a mental hunt for subsistence rather than an active bodily one. The natural life with its bodily activity has become an artificial one of more or less bodily immobility, and what nature unconsciously did to promote and maintain proper respiration must now be done by conscious effort and artificial methods, like gymnastic and athletic exercises and training. True, a man could live in tolerable health in this inactive condition, only half filling his lungs, if he were always sure of remaining in it, but he never knows when an emergency may arise which will require the respiration which well-trained lungs can only give, be it an unwonted exertion, an acute disease, or exposure to a tubercle bacillus when the nutrition happens to be poor or the system depressed. And further, the sense of physical well-being is much greater when the respiratory tide is full and strong, as the experience of all of us will testify after some exercise which makes large demands upon the "wind," as bicycling, for instance. As the late lamented Baron Posse * has so well said, "To breathe well means to live well, to live longer, and to live better."

Having, then, determined the necessity of full, free respiration, what are the means to obtain it? First, there are the indirect ones, in the form of general exercise, gymnastics, athletics, and all forms of muscular exertion, provided it is energetic enough. Of course, the result is obtained by a greater demand for oxygen and a greater production of carbonic acid, which requires more energetic respiratory activity. Now these are applicable not only to those in ordinary health but as well to those who suffer from some pulmonary lesion but at the same time are capable of a certain amount of muscular effort—bronchitics, the emphysematous in the intervals of the acute attacks, convalescents from pneumonia and pleurisy, and the tuberculous when not febrile.

The following case is an illustration of the beneficial effect of breathing exercises in pulmonary disease. Miss C., the head nurse of the Consumptives' Home, contracted while in service a pleuritic effusion of the right chest, presumably tubercular. The fluid filled two-thirds or more of the cavity. Aspiration was performed several times; and as soon as the patient could sit up, breathing exercises were instituted. The absorption of the remaining fluid and the expansion of the lung were prompt, and the process, I believe, was materially hastened by the persistent use of the respiratory exercises.

The general exercises which are good for increasing the respiratory power are very numerous, as we know. Walking, however, I do not consider a very valuable one. "A person who only works and walks," as a recent writer on bicycle exercise says, "hardly ever fills his lungs." There is swimming, tennis, rowing, bicycling, skating, golf, running, jumping, hand-ball, mountain climbing, going upstairs, the *cure de terrains* of Oertel, dancing, singing, reading aloud, free-hand classwork in the gymnasium, and rope-jumping. I was recently told by one conversant with the training of boxers that rope-jumping was a common form of exercise with them for increasing the "wind." All exercises which bring the legs into violent action are especially good for the respiration, on account of the number and size of the muscles employed. Secondly, there are the direct or local respiratory exercises, those especially devised for training and developing the respiratory muscles and lungs. Now these direct lung exercises are also applicable not only to the well but to those who, from pulmonary lesion or general bodily weakness, are unable to undergo the more active general exercises, for they increase the efficiency of respiration, without increasing the *need* of respiration, creating the "thirst for air." Of course, all exercise is interdicted to those suffering from acute inflammation, the febrile state, or serious hemorrhage.

These especial pulmonary exercises are simple and yet efficacious: Standing erect in a well-ventilated room, or wherever there is pure air, with the hands on the hips and taking long deep inspirations and slow expirations, beginning at the bottom of the chest and filling up, so to speak. This, alone, done several times a day will often materially increase the lung capacity, as I have frequently verified. "Numerous observations," says Lagrange,* "prove that it is enough, voluntarily to take a certain number of deep breaths every day, to produce in a short time an increase in the circumference of the chest, which may amount to two or three centimetres."

---

* Baron Nils Posse, G. M.: Special Kinesiology of Educational Gymnastics, 1894.

* La Médication par l'Exercice.

In these breathing exercises the rhythm can be varied according to the following schedule:*

(1) Slow and long inspiration and expiration.

(2) Inspiration and expiration long and quick.

(3) Slow and long inspiration, and long and quick expiration.

(4) Long and quick inspiration, and slow and long expiration.

(5) Short inspiration and long expiration.

(6) Long inspiration and short expiration.

(7) Short inspiration and expiration.

(8) Inspiration by two or three stages or jerks, and expiration long.

(9) Inspiration long and expiration by stages or jerks.

(10) Inspiration and expiration by stages or jerks.

In all these exercises one should breathe through the nose only.

Then there are the various arm movements with their modifications in connection with the deep breathing, slowly raising the arms to a horizontal position and then over the head until the hands meet, slowly and deeply inspiring while performing the movements, and expiring while lowering the arms, thus the supplementary respiratory muscles of the chest and shoulders are brought into action.

Raising the arms and then carrying them back and down, describing a movement of circumduction. Standing erect and straightening up and finally rising upon one's toes, deeply inspiring during this movement. Extending the arms in a horizontal position and carrying one of the legs back so as to offer a large base of support to the body. Lying on the back horizontally upon the floor or a table and raising the arms backward and over the head while inspiring; if lying upon a narrow table, the arms can describe a circle about the head. The exercises with wands or bar-bells, which demand rather more exertion perhaps than the free-hand movements. In the Swedish system of gymnastics there are almost an innumerable variety of respiratory exercises, most of which, however, are but modifications and combinations of a few simple movements, and most of them can be performed without apparatus. Then there are the gymnastic devices and apparatus for increasing the lung capacity and developing the respiratory muscles; the so-called "chest-developers" and "lung-expanders"; the "chest-weights" and quarter-circle"; the high parallel bars and travelling rings; and the heaving movements of the Swedish gymnastics, which are usually exercises of hanging and climbing by means of rings, bars, ladders, and poles.

Renzi* describes the following apparatus for prompting deep respiration, which he makes use of with beneficial results in his clinics as well as in his private practice: To two hooks in the wall are attached cords, and to these a cross-bar much like a flying trapeze; the height of the bar is adjusted to the height of the patient. This cross-bar is seized by the patient with outstretched arms, who leans forward, forming a curve with his body, the two points of support being the hands on the bar and the toes on the floor. In this position of the body the patient is forced to take deep inspirations whereby the thorax is much expanded. The standing position is then resumed, and the thoracic muscles relaxed, when a deep inspiration is practised. These two movements are performed alternately from twelve to twenty times a minute.

If the patient is too sick or too feeble to take any of these various exercises, either free-hand or with apparatus, he can be given passive respiratory exercise, much after the manner of the Sylvester method for producing artificial respirattion. Sitting upon a bench or stool and leaning upon the chest of an attendant standing behind him, the arms are raised above the head synchronously with inspiration. With the lowering of the arms and pressure against the sides forced expiration is produced. This can also be practised in the recumbent position.

Although the movements of inspiration are the most important in the respiratory act, yet expiratory exercises have their place. These are generally passive, like the act itself. One which Lagrange especially notes is the following: The subject lies flat upon the abdomen on the floor or a bench and raises his head and shoulders, thus contracting the extensor muscles of the vertebral column. In this attitude the abdominal muscles are stretched and prevented from contracting and pulling down the chest-walls. In this position forced expiration is practised. In emphysema especially expiratory movements are useful; these can be simple direct pressure upon the chest-walls, with various manipulations of the thoracic muscles, or a peculiar Swedish movement also noted by Lagrange; it has for its object the mobilization of the semi-ankylosed chest-wall, which is a condition existing in chronic emphysema. The patient is seated astride a narrow bench or his legs are held and two attendants seizing him by the shoulders rotate the trunk upon its axis, alternately from right to left and left to right, the object being to mobilize the vertebro-costal articulations and to restore movement to the chest-walls.

---

*De Bouffémont: Manuel de Gymnastique Eclectique.

*Dr. E. De Renzi: Pathogenese, Symptomatologie und Behandlung der Lungenschwindsucht, 1894.

Besides all these methods of respiratory exercise there are certain machines or apparatus devised by Zander and Nycander. Some excite deep inspiration by passive movements for raising the ribs, others render the expiration more complete by compressing the ribs through the use of girths or straps which compress the thoracic walls at the moment when the lungs empty themselves of air. The latter machines are said to render great service in pulmonary emphysema, where the expiration is always laborious and incomplete.

Finally, we have massage of the respiratory muscles, which the Swedish physicians always prescribe at the same time that active and passive gymnastic movements are given. As will be seen, the number of exercises available to produce better respiration are very numerous and varied, but the underlying principle is simple, namely, to bring into more vigorous play the muscles which expand the thorax, and at the same time excite deep, full, free breathing; to bring the vital force of the lungs to its maximum. It must be borne in mind that all exercises of the thoracic muscles for the purpose of producing an increase in that cavity must at the same time be coincident with deep breathing; the amplitude of the respiratory movements must be increased; the lungs must push out from within as well as the thoracic muscles pull from without. Once having established a proper respiration by the use of some of the simple respiratory exercises and devoting a few minutes to it every day the habit of full and deep breathing is formed even when one is in a state of repose. And further, one is fortifying himself against the possibility of disease of the lungs by thus maintaining the pulmonary tissue in an active, healthy, and well-nourished condition; and there is no portion of the apices which from insufficient use and poor nourishment is a menace to the individual by offering a fitting soil to a wandering bacillus. In convalescence from pneumonia and pleurisy with effusion, the importance of expanding and revivifying, as soon as possible, the lung, whose functional capacity has been diminished and whose nutrition has been depressed, can hardly be overestimated. As Lagrange truly says: "In all the inflammatory maladies of the lungs there persists a tendency to stasis and passive congestion, to correct and obviate which no means is more efficacious than very ample and deep inspiration."

When the border-line has been passed and incipient phthisis has been developed, respiratory exercises are a most important and precious means for restoring the weakened lung tissue and increasing its resisting power. The beneficial effects of the high-altitude treatment are largely due to the fact that one is compelled to breathe fully and deeply in order to obtain the requisite amount of oxygen.

In every well-arranged plan of treatment of pulmonary tuberculosis, where any exercise at all is allowable, pulmonary gymnastics, carefully arranged and adapted to the strength and condition of the individual, should, I believe, be embraced. In the famous sanitariums abroad, where such excellent results are obtained, they play an important part in the treatment. We may in the future obtain a serum product which will accomplish all that was hoped for from tuberculin; but one must not forget that large numbers of consumptives are now being cured and restored to usefulness by means of the persistent application of nature's remedies—sunlight, abundant alimentation, continuous outdoor life, hydrotherapy, and good breathing. The *vis medicatrix naturæ* may not always give brilliant and rapid results, but when intelligently employed it is a method which rarely disappoints either the confiding physician or trusting patient.

THE USE AND ABUSE OF ARTIFICIAL DRUM MEMBRANES.

By Vincent Gomez, M.D.,

Instructor in Diseases of the Ear, New York Polyclinic; Visiting Ophthalmologist to the Workhouse and Almshouse Hospitals (B. I.); Assistant Surgeon New York Eye and Ear Infirmary, etc.

Of late years the use of the artificial drum membrane has assumed great importance in the minds of the laity by its recommendation for all diseases of the ear, by interested advertisers, who describe it as a new invention and sell it for a very large price.

In the great majority of cases patients who procure and use these membranes without the advice of the aurist are those who are suffering with some catarrhal condition of the middle ear. Under these circumstances the artificial drum-head not only does no good but positive harm. This condition does not warrant the employment of an appliance of this sort, for the drum is intact and frequently much more dense than normal; so that the artificial membrane acts as a further obstruction to the sound-waves and naturally will make the patient's hearing worse.

We also find patients wearing artificial drum-heads in chronic suppurative conditions of the middle ear, and here again they dam back the pus, and this fluid being usually of an irritative nature it gives rise to eczema of the external auditory canal, or else, by obstructing the egress of the discharge, causes acute symptoms which if not promptly checked will produce grave results.

Many times we are asked to give advice to patients as to the wisdom of using artificial drum membranes, and when we examine the ear we find a thick, opaque, and retracted *membrana tympani*, which shows that the patient already has really too much membrane, and the use of the artificial drum would only be making matters worse.

I have seen cases in which patients were using these drums where there was not the slightest indication for their employment. Amongst these have been a great many instances where there was apparently a perfectly normal condition of the middle ear, but grave disease of the auditory nerve elements. In such conditions as these it is absurd to resort to drum membranes and suppose that they will improve the hearing power, when we have an intact *membrana tympani* with a deficient nervous apparatus.

Again, the majority of artificial drums that are to be found on the market are cumbersome, and irritate not alone the walls of the external auditory canal but do positive injury to the existing membrane, at times giving rise to a myringitis or to eczema, thereby impairing the functions of the membrane.

The artificial drum, there is no doubt, does do good in well-selected cases, and, as said before, it does positive harm in the cases where its employment is not warranted, often rendering the organ of hearing functionally incompetent by giving rise to aggravation of the primary otitic affection.

The artificial drum membrane was first used by the laity in 1640, and afterwards by the profession. It has been made of a great variety of materials. Tearsley, of London, in 1841, selected a cotton pellet for the purpose, and in his book he says a great deal about his new method of treating deafness. Like all "new methods" it was rather extravagantly extolled, and after a few years fell somewhat into disuse. At the present time, however, the cotton is being used more than formerly, and it seems, on the whole, to be perhaps the best form of artificial *membrana tympani*. It has this great advantage, that it is not likely to act as an irritating, foreign substance.

Besides acting as an artificial membrane, the cotton is sometimes used as a dressing in the dry treatment of a perforated membrane. When it is employed for the purpose of improving hearing, it is first slightly moistened, and then inserted by the aid of a pair of forceps, which should be so contrived that the blades come together with but little pressure, or by a probe.

The appropriate position for the cotton, where it will improve the hearing, will be found by placing it in different parts of the exposed tympanic cavity, or against the remains of the membrane, until the patient obtains an improvement in the hearing power. Sometimes it seems unnecessary for the cotton to cover the exposed surface *in toto.*

With practice, patients attain a dexterity in manipulating the contrivance that is surprising.

Perhaps the best known artificial membrane besides this is one introduced in 1853 by Toynbee. This consists of a thin circular disk of soft sheet rubber, in the centre of which is attached a fine wire about an inch long, which terminates in a small ring to permit its removal with more readiness. The rubber disk sometimes requires to be pared down by means of scissors, so as to accurately fit the canal. As Toynbee's disk is fastened by two round plates to the stem of the handle, it sometimes becomes detached. To obviate this a Nuremberg mechanic caused the wire to be made into a spiral form so as to catch the rubber as a corkscrew would hold a cork. Lucæ has covered the wire with a bit of rubber tubing to prevent the unpleasant rattling of the unprotected wire in the ear. Gruber uses a similar piece of rubber to that of Toynbee, but attaches to it a piece of silk thread so as to draw it out of the ear when necessary. He claims less irritation than with Toynbee's instrument.

Artificial drums are sometimes made of tin-foil, it being used in the same manner as the cotton. Another material that answers the purpose quite well is ordinary blotting-paper.

The indications for the use of the artificial drum membrane are as follows:

1. When a drum cavity needs protecting from the air.

2. Whenever the ossicula are detached from each other, the result of destruction of their ligaments, or from failure of the membrane to keep them in proper contact, or even a severance of continuity consequent on relaxation of the ligaments or absence of the incus, with a gap existing between the membranes and the stapes (the latter also may be in a state of subluxation from relaxation of its annular ligament), the artificial membrane keeps it properly in position. The artificial drum by moderate pressure restores contact of these parts and presents an unbroken medium for the transmission of sonorous undulations to the oval window.

Dr. Burnett gives a different explanation of the action of the membrane which seems reasonable. Where the natural membrane has a large perforation with the ossicula in proper relation, and the membrane is greatly retracted in consequence of the non-resistance of a normal membrane to the actions of the tensor, there is undue pressure on the labyrinth, and the indications are not to press on the membrane to coaptate the parts, but to draw it outwards; this he does by tucking a bit of cotton beneath and behind the handle of the hammer. He states that this may be the secret of the non-improvement to the hearing in so many cases where the artificial membrane is inserted in the ordinary manner.

From what has been said it can be seen that the artificial drum in well-selected cases does good, but in the cases where its employment is not warranted it may give rise to unpleasant complications.—*Polyclinic.*

DIET IN RHEUMATISM AND GOUT.

By H. H. Hawxhurst, M.D.

These two conditions are considered together not because there is any real similitude, but because in the popular mind they are believed to be congeners, though as yet investigation has established but a very distant relationship as a basis for their apparent likeness. This common ground seems to be in certain disturbances of the functions of the liver. Rheumatism attacks the large joints, gout the small. In gout there is a history of gouty ancestors or of high living; in rheumatism there will be a history of exposure or exhaustion. In gout there is an excess of uric acid in the blood which is never the case in rheumatism.

Rheumatism in its acute and subacute forms—sometimes known as rheumatic fever, being a febrile affection—is to be treated as such dietetically. Milk is, of course, the food *par excellence*, and may be given raw, scalded, iced, skimmed, diluted with alkaline mineral waters, or by any method acceptable to the patient. Chicken, beef, mutton, or lamb broth in quantities of two or three ounces may be used to vary the milk diet. For the thirst, which is excessive, and to be freely allayed, plain water, seltzer, lemonade, oatmeal- and barley-water are excellent. A fuller diet comes with convalescence, but meat should be introduced last and very cautiously. Chronic rheumatism of the joints is not greatly influenced by diet except in so far as a high standard of general health is attained by easily digested and highly nutritious food. One article claimed to greatly benefit rheumatic affections is celery. It is said to favor the alkaline condition of the blood, when eaten freely, which renders rheumatism more or less impossible. Muscular rheumatism, being probably an affection not of the muscular tissues but of the sensory nerves of the muscles, is not influenced by food.

Unlike rheumatism, gout in both acute and chronic forms can be remarkably influenced by dietetic treatment. Once gout was considered to be only an affection of the small joints of the extremities, but now the disease is recognized in many irregular forms. Certain skin affections, neuralgias, and headaches have a gouty basis. The heart may be troubled in various ways. Urinary disorders often find an explanation if gout is suspected. Chronic bronchitis is sometimes the local expression of a gouty habit. Even the eye is subject to gout. It is evident, then, that gout is a constitutional affection. From the now generally accepted fact that the disease is associated with an excess of uric or lithic acid in the blood, the gouty constitution has received the name uricæmia or lithæmia. One of the most interesting details connected with uricæmia is that it may be hereditary; another is that it occurs almost entirely among high-livers. From the latter fact we argue that nitrogenous food-stuffs in excess of what what can be successfully oxidized in the body are factors in producing gout. From the former that children of gouty ancestors possess a liver worn out by generations of excessive toil. By these two points again are we directed unmistakably to the food to be employed to prevent or relieve the excess of uric acid. Quantity as well as quality of food must be considered in this condition; indeed, in many cases a reduction in amount will be more effective than change in the character of a diet. Especially is this the case in corpulent patients; and to fully satisfy one's appetite should be an unknown experience to every gouty individual. Almost as grave an error in dieting a gouty person may be committed by enforcing too rigorous an abstinence as by allowing too much freedom. The active, bustling patient requires more for the due nutrition of his body than the student or bank clerk, or indolent sedentary man of leisure. It is also a mistake to cut off entirely all nitrogenous foods from a man who has attained middle age and gout, and compel him to depend for indefinite periods upon a vegetarian diet alone. Such an extreme, if necessary, should be reached by graduated steps. A total and sudden change of diet can only be risked in young patients upon whom life-long habit has not fixed its impress.

Soups not made from meats or meat extracts are permissible, though there is no objection to flavoring a vegetable soup with a teaspoonful of some meat preparation like Valentine's beef-juice. Pea and bean soups, being rich in albumin, are better off the gouty table than on. Fish soups are not objectionable. Animal food must be taken in great moderation. It has been asserted that nearly nine-tenths of the entire population of England sooner or later become victims of gout in one of its many forms, and it is thought that the beef-eating habits of Englishmen for generations are responsible for this condition. The human stomach is capable of perfectly taking care of only about three ounces daily of nitrogenous material. When this quantity is regularly exceeded the extra labor required of the stomach results in imperfectly digested products which are worthless for the purpose of body nutriment, and must be treated as so much waste material by the liver. If this organ is able to perform its work of destroying useless material well and good, but sooner or later the overtaxing results in failure in this protective function, and a flood of toxic material in the shape of uric acid passes into the system to localize in the joints, heart, kidneys, and a dozen other places. Meat, then, should be partaken of but once a day, preferably from a roast and in limited amounts. White meats are better adapted to a lithæmic condition than those which are brown. Smoked or cured meats, presenting as they do a very condensed form of nitrogenous food, cannot be allowed. Fat meats, particularly in the corpulent, are injurious. Eggs, being rich in fat and nitrogen, must not enter into a strict gouty dietary.

Fish and oysters are to be sparingly used and never the same day with meat. The rich and firmer-fibred fish, such as salmon and mackerel, and smoked fish should be avoided. Lobster and crab, particularly in salad form, are to be eschewed. Potatoes and the ordinary green vegetables are permitted. Turnips, parsnips, squash, and beets are unobjectionable in moderation. Tomatoes and asparagus are in dispute, but no harm will be done by omitting them from the list. Mushrooms, peas, beans, spinach, and rhubarb have been placed under ban. Bread, best toasted or three days old, may be moderately indulged in. Most fresh ripe fruits are wholesome, as are cooked fruits, oranges, and lemons, unless some gastric or intestinal disturbance is provoked thereby. The very sweet fruits, or those sweetened excessively in cooking, and strawberries, bananas, and melons should not be eaten at any time. Eggs are the test by which to measure puddings; the plainer the pudding the better the eating from the dietetic standpoint.

Total abstinence in the matter of alcohol is by far the wisest plan for the gouty, and for those who inherit a tendency to gout. Port wine, strong and sweet wines, champagne, beer, porter, and stout are especially calculated to foster lithæmia. Coffee, light China tea—the Indian is too rich in tannin—and cocoa are permissible in moderation if not too sweet and strong, or contraindicated by dyspepsia. Milk is permitted. When not well digested it may be skimmed. An excellent method of giving milk to the gouty is this: About ten minutes before breakfast drink a coffeecupful of hot milk and water to which a small saltspoonful of the bicarbonate of potassium and the same quantity of table salt have been added. Or milk may be rendered alkaline by adding a little alkaline mineral water, such as Vals or Vichy. One or two prominent medical authorities look upon water with little favor as a beverage for the gouty, but the mass of physicians are in evidence strongly to the contrary. Several ounces of hot water taken three or four times daily, say one-half hour before meals and at bedtime, is of great benefit. Indeed, patients accustomed to the hot-water treatment have frequently experienced acute attacks of gout upon its omission for a day or two. Of the different natural mineral waters those most important for use are: Carlsbad, Marienbad, Vichy, Vals, and Saratoga.

The comparative dietary for lithæmia follows:

MAY TAKE.

SOUPS.—Vegetable, white soups made with cream, fish soups, oyster soup.

FISH.—Fresh fish, raw oysters, and clams, mussels, scallops.

MEATS.—Beef, mutton, lamb, chicken, rabbit, white meat of game, liver and bacon, all sparingly.

VEGETABLES.—Potatoes, carrots, turnips, parsnips, beets, Brussels sprouts, cabbage, lettuce, green corn, onions, salsify, seakale, celery, cucumbers, salads.

CEREALS.—Bread in moderation, toast, whole-wheat bread, rye bread, oatmeal, cracked wheat, rice, zweiback.

DESSERTS. — All milk puddings made without eggs, fresh ripe fruits ; cooked fruit, f not too sweet.

LIQUIDS. — Water plentifully, alkaline mineral water, seltzer, Vichy, Lithia, etc. ; skimmed milk, or milk diluted with Vals or Vichy water ; weak China tea, coffee, chocolate.

AVOID.

SOUPS.—Those made from stock, strong meat soups, and extracts ; pea or bean.

FISH.—Salmon, mullet, mackerel, lobster and crabs, cooked oysters and clams, salt fish.

MEATS.—Pork, ham, veal, salt meats, turkey, duck, goose, dark meat of game, all made dishes; gravies, eggs.

VEGETABLES.—Mushrooms, rhubarb, sorrel, tomatoes, asparagus, peas, beans, spinach, truffles.

CEREALS.—Bread in quantities and fresh, hot rolls, hominy.

DESSERTS.—Pies, pastry, rich puddings, jellies, preserves, patties, confectionery, cakes, blanc-mange, desserts containing gelatine, cheese, strawberries, melons, bananas, nuts, tobacco.

LIQUIDS. — Ales, strong beers, porter, stout, champagne, port, sherry, Madeira, Burgundy, and the stronger clarets ; all spirits, strong tea.—*Table Talk.*

CYCLING FOR THE UNSOUND.

By E. B. TURNER, F.R.C.S.

IT being granted that for those who are physically sound the exercise of cycling is not harmful, the question arises, and is very frequently asked, "To what extent may a person who is unsound participate in this recreation, and for what ailments may we expect to find the bicycle an aid to cure ?" The answer depends entirely on the nature and degree of the unsoundness, and, in discussing the matter, it is proposed to treat first of cases in which there exists an actual organic lesion, and then to consider those of less importance and more hopeful prognosis in which the derangement is functional only.

VALVULAR DISEASE OF THE HEART.

With regard to valvular disease of the heart, it is evident that all persons who suffer from lesions of the aortic valves should not be allowed to ride at all. The risk that any extra strain thrown on the damaged organ might be followed by most serious consequences is too great to be incurred. With regard to uncomplicated mitral disease, experience teaches that in a large number of cases actual benefit has resulted from a mild course of cycling exercise.

In giving advice on this matter, the fact, mentioned in a former article, must always be borne in mind, namely, that the force necessary to propel the weight of the body on wheels is very much less than that which is required to carry it on its own legs; and that to ride four miles on a cycle is a far smaller tax on the circulatory and muscular systems than to walk one. If a sufferer from mitral incompetence in its early stages be allowed and encouraged to take gentle and regular exercise on either a bicycle or light tricycle, he will maintain his general health in better condition, and at the same time give the heart-muscle that amount of work which is necessary to prevent degeneration of its tissue, and thus retard dilatation of the cardiac cavities. It must, of course, be a rigid law in such cases that no hills be ridden under any circumstances, and no speed attempted. Breathlessness must never be produced, and no ride attempted until 1½ hour after a meal. Under such a *régime*, great and lasting improvement has been observed in many persons, but of course each case must be judged by its surroundings and on its merits, and leave given or withheld as seems good to the medical adviser. With respect to tricuspid mischief, no actual experience has been put on record, but it appears theoretically the wiser course not to experiment, but to carry on the treatment on the old lines. It is superfluous to point out that where aneurism exists or when symptoms of angina are present the bicycle must be "tabu," and that if the arteries show signs of atheroma the greatest caution must be inculcated, and in all cases of doubt the exercise forbidden.

FUNCTIONAL CARDIAC DISEASE.

A weak heart-muscle *per se* is not an absolute bar to riding, and if the weakness depend on a state of want of "tone," and general "flabbiness," it may be much improved by the judicious use of the wheel, prescribed under such restrictions as are necessary when the mitral valves are at fault. If a condition of fatty degeneration be detected, or if the cavities of the heart are dilated, and their walls thinned, it stands to reason that nothing but harm can ensue from attempting a new and unaccustomed form of exertion.

DISEASES OF THE VENOUS SYSTEM.

The only other diseases of the circulation which depend on some organic change, and are of interest to the present question, are those of the veins. Ordinary varix of the lower limbs, however produced, is very frequently much benefited by regular cycling, but if the enlarged veins be of considerable size a stocking should be worn. Out of a very large number of such cases the writer has never seen the slightest increase which could be put down to riding, not even in men who raced long distances on the road and path, while in many cases of infiltration of the skin and varicose eczema a perfect cure has resulted. A suspender should always be used if the rider has a varicocele, as a protection from injury by the saddle, when the roads are rough and lumpy. Piles diminish and cease from bleeding in a wonderful fashion by the time a few hundred miles have been judiciously covered, and though, of course, external masses must remain, they do not as a rule increase. No person is likely to wish to cycle while suffering from phlebitis, or blocking of any large vein, but when all is quiet, and the clot organized, and the vein obliterated, gentle and regulated riding has been found of use in getting rid of the œdema which is sometimes so persistent.

DISEASES OF THE NERVOUS SYSTEM.

It is not probable that an opinion whether it be advisable to continue or resume cycling exercise in cases where there is an organic lesion of the brain or nervous system will often be sought, but such questions do sometimes arise. The writer has on several occasions forbidden an epileptic to mount, and has seen no harm result from allowing a moderate indulgence in the pastime to a patient with ataxia in the early stages. It would very seldom be wise to grant the same liberty to one recovered from a mild attack of cerebral hemorrhage, though it is possible that under certain circumstances good rather than harm might result. Distinct benefit ensued from mild tricycle exercise in the later stages of recovery from an attack of left hemiplegia dependent on a cerebral gumma, but every case of this description must stand on its own merits, and no general law can be laid down.—*Brit. Med. Jour.*

A PARADISE OF PRUNES.

By Nellie Blessing Eyster.

(*From Harper's Weekly.*)

Eat plenty of fruit, say the doctors, and, other things being equal, longevity is secured.

"Plenty of fruit," echoes Hygeia, as she fills to overflowing her bowl with its choicest juices for the delectation of the children of men.

"Few dried fruits retain their succulence like the prune, which has a nutritive value peculiarly its own," says a modern scientific socialist, who "loves his fellow-men."

"Mind thee, dear," said a Swedish mother, "when thy lips need a settled expression of gentleness and sweetness, obtain it by repeating in rapid succession the word 'prunes, prunes, prunes.'"

With such a weight of testimony to the peculiar value of even one species of fruit, it is a cause of congratulation upon the increase of human knowledge and pomological production that in California, "the land of sunshine, fruit, and flowers," is a valley known as Santa Clara, which contains more than one-half of all the prune-trees in America, and whose output of that valuable fruit dried last year was forty millions of pounds.

The visitor to the California department of the Columbian Exposition was confronted, when he entered it, by the image of a horse with a knight in full armor mounted thereon, both horse and knight made of dried prunes. Few could appreciate the significance of the strange symbol, but it represented an amount of industry, sagacity, prosperity, and beauty of which the untravelled masses know nothing.

When men's hearts have failed them because of the worried depression throughout the land, when hay, grain, horses and cattle, and even silver seem as hard to sell as to obtain at a living price, it is a cause for thanksgiving that the marvellous orchards of Santa Clara Valley never fail to yield their harvest, and that from its fertile soil is produced a larger income than from any other territory of equal area on the face of the globe. Not inaptly is the Santa Clara Valley coming to be regarded as "The Garden of the World."

The county of Santa Clara, containing in round numbers one million acres of land, is situated about the centre of the State (counting north and south). It is fifty miles south of San Francisco, with which it is connected by three lines of railroad, and is within thirty miles of the Pacific Ocean.

The celebrated Lick Observatory, on the summit of Mount Hamilton; the Leland Stanford Junior University; the State Normal School; the Catholic Colleges of Notre Dame and Santa Clara; the elegantly equipped city of San José (pronounced San Hosey), whose forty thousand citizens claim it as "The Athens of the Pacific"—are a rare combination of attractions in one county to the tourist and home-seeker; but from the practical standpoint of actual capacity to be a benefactor of teeming millions of fruit-lovers, Santa Clara County is almost without a peer.

More than one-third of all the fruit shipments of California are sent abroad from this county. Of course, this includes peaches, apricots, and miscellaneous fruits, canned and green, yet, on account of its exceeding abundance, cheapness, and intrinsic quality, no other fruit production brings so much gladness and "creature comfort" into thousands of homes of the working population as the dried prune.

The plum known as the French prune is the standard fruit, and grows nowhere to such perfection as in Santa Clara County. Averse alike to extreme heat and cold, it finds the exact temperature suited to its temperament in a climate where a fall of snow to the depth of two inches is so rare an occurrence that it marks an epoch in local history.

The valley being protected on one side from the harsh winds and heavy fogs of the ocean by a range of high mountains, and on the other by a range of hills which wall it in from the hot atmosphere of the great interior plains, the necessary conditions are produced for the highest development of the delicious prune.

A ride through one of the vast prune orchards when the trees are in full bloom is an experience never to be forgotten. Some of these orchards, consisting of 500 acres, contain 50,000 trees, their ages varying from five to ten years, and planted in regular rows about twenty feet apart.

Nor pebble, nor clod, nor blade of grass can be found among the friable soil of the miles long aisles which intervene, tessellated by the flickering shadows of the swaying snowy petals which project on either side from flower-laden branches. Bird and bee and butterfly are each alive to the situation, and puncture the perfumed air of a cloudless May morning with song, buzz, and voiceless wing.

Among this embarrassment of beauty walks the alert, intelligent orchardist, watching with the trained eye of an artist the development of the tiny bud of the embryo prune upon the tree, until picked at the prime of its perfection with the deft hand of an expert. In order to produce the desired uniformity of size and shape, each fruit-bearing bough is subjected to such thinning and pruning that there lie scattered around the base of a tree often more rejected prunes than are left hanging upon its branches.

As the Eastern plum pest, the curculio, is unknown in California, as scarcely a drop of rain falls upon the trees from May until November, and as there is no scorching sun to shrivel the delicate skin of the prune nor rough wind to mar its contour, a bough of full-ripened clusters represents one of perfect prunes.

In an area from six to twelve miles square planted to fruit-trees, 18,000 acres are in prunes alone.

They cover the billowy surface of the majestic foot-hills, as well as the plain, with a beautiful irregularity impossible to describe. At plucking-time thousands of busy hands are at work, chiefly those of boys and girls, preparing the luscious fruit for curing under the rays of the midsummer sun.

The average yield when the crop is full is about eight tons per acre. The average cost of caring for the orchards, harvesting and curing such a crop, is $30 per acre, leaving a net income per acre of $210.

As it has been ascertained by experience that prunes dried in an evaporator, or, as in France, subjected to a high degree of artificial heat, were more or less cooked, and hence lose flavor, they are now allowed by the Santa Clara orchardist to remain on the trees until perfectly ripened, when they are plucked, washed, and subjected for a week to the sun's rays by being laid in shallow drying-trays. They are then packed carefully in boxes for the market, the increase of whose demand is almost as phenomenal as the magnitude of the supply.

Dried prunes are the most economical fruit to use when properly prepared and cooked. It requires two and a half pounds of raw fruit to make one pound of dried. To get back the full value and flavor, seemingly lost by the one week of curing, the water which was extracted in the drying process must be largely replaced. This is done by soaking the fruit in cold water twenty-four or thirty-six hours, in the proportion of two and one-half pints of water to one pound of fruit. The prunes afterward will cook in a little less than an hour require very little if any sugar, and the gain will be two quarts of fruit, delicious and wholesome, at a cost of but a few cents per quart.

Enter the representative domain of a Santa Clara Valley prune orchardist. Taking the first footstep with a good thought, the second with a good word, and the third with a good deed, and one enters into the Paradise of Prunes.

THE USES OF STRAWBERRIES.

According to Dr. Withering: "They are grateful, cooling, sub-acid, juicy, and have a delightful smell. They promote perspiration and dissolve the tartarous encrustations upon the teeth. Persons afflicted with the gout or stone have found great relief from using them largely; and Hoffman says he has known consumptive patients cured by them."

Withering's four-volume work on "Botany" is well worthy of a place in every medical man's library, for, apart from its special object, it is replete with remarks on medical and dietetic subjects. Its author, as all know, was a distinguished physician of wide learning. It was of him, when on his deathbed, that it was plaintively said that the flower of physic was withering.

Pharmaceutic Reviews.

DEVELOPMENTS IN CHEMISTRY.

COFFEE making is a simple process; but given good coffee-beans to start with, how many can make good coffee? Just so in chemical manufacture. Given good material, how indifferent may the result be unless the particular process is carried on by fixed methods and skilful manipulation.

In the manufacture of certain chemicals, very sensitive to external influences and delicate in character, unless the processes are carried on under identical conditions and by skilled workmen results vary so much that frequently when the finished product is in the hands of the consumer it seems to be an entirely different article.

Particularly is this true of pharmaceutical preparations, and there is no article in the Pharmacopœia which requires more skill and care in its preparation than hydrogen dioxide. It is well known that in the early exploitation of this product many physicians became so confused and disgusted that they gave up the use of one of the most valuable remedies of the day. It was not the fault of the physician, nor of the article, but entirely the fault of the manufacturer, who, perhaps from lack of knowledge, experience, or interest, would supply a product, not knowing whether it was good, bad, or indifferent.

Happily, however, there are now solutions of hydrogen dioxide of known and definite character which can be entirely relied upon; in fact, so much has the article been improved that it is now possible to get a solution which will be found to be of full strength, even if it has been uncorked for several months. The Oakland hydrogen dioxide conforms with these requirements and is entirely reliable.

The physician can by simple tests determine with fair accuracy the value of a solution. If taken into the mouth it will cause a rapid frothing or formation of foam like soap-suds; if it does not do it it is valueless; it will taste like a bit of metal, slightly sour but not distinctively so; if it is sharply sour reject it as containing too much acid; if uncorked bottles are found to deteriorate in strength materially, then the solution is not of sufficient stability.

A good solution will also stand concentration by evaporation over a sand-bath, in a smooth porcelain dish; one oz. of a 3% solution evaporated at not higher than 150°, to ¼ oz. will be found to be 11 to 12 per cent. Marked pressure on opening the bottles is an indication of poor manufacturing methods. The solution when properly made is like a fine mechanism: the constituent parts are so delicately united, so evenly adjusted that until some external influence is brought to bear they maintain the even relation, which is necessary to a finished stable and product.

In hydrogen dioxide when these conditions do not exist the solution decomposes rapidly, and the changes of temperature cause disturbances sometimes to such an extent as to cause such rapid decomposition that explosions occur.

Hydrogen dioxide, when properly prepared, is perhaps the most valuable of antiseptics, and its range of usefulness in surgery and therapeutics is only limited by the field of its only available constituent, oxygen, of which Faraday has calculated the daily consumption to be 7,142,857 tons.

A TONIC-NUTRIENT.

THE purpose of food is twofold: to nurture and repair waste tissue, and to give strength or sustenance to resistance against the influences that are ever present in the environment of human beings, and which are at war with health and would destroy life.

Vast quantities of food are ingested through ignorance, which act is prompted by abnormal appetite and crave, that seeks satisfaction in mere effort to please the palate. Such ignorance soon reaps its natural harvest in disordered digestion and diseased bodily function. It is all-important at times that both the physician and his patient shall become more fully advised as to the dietetic value of food, so that the greatest nutrition may be accomplished with the least organic labor. There are several well-known foods which fill this important place. Among them *cocoa-chocolate* stands pre-eminently at the front. For over three centuries chocolate has held a leading position as a *tonic-nutrient.* It is well named "Theobroma," food of the gods, for it contains in compact form a highly nutritious food of great palatability, which is quickly appropriated as a repairer of tissue waste, and whose tonic influence is immediately apparent to the flagging system. It is of course absolutely necessary that the cocoa-chocolate shall be pure. Cocoa is chocolate with its excess of fat removed, and good chocolate is cocoa with that proper proportion of fat retained which permits of its easy digestion and assimilation as food.

Walter Baker & Company, of Dorchester, Mass., U. S. A., have given years of study to the skilful preparation of cocoa-chocolate, and have devised machinery and systems peculiar to their methods of treatment, whereby the purity, palatability, and highest nutrient characteristics are retained. Their preparations are known the world over and have received the highest endorsements from the medical practitioner, the nurse, and the intelligent housekeeper and caterer. There is hardly any food-product which may be so extensively used in the household in combination with other foods as cocoa-chocolate; but here again we urge the importance of purity and nutrient value, and these important points, we feel sure, may be relied upon in Baker's Cocoa-Chocolate.

THE TREATMENT OF GASTRO-ENTERITIS.

A LITTLE more than a year ago Dr. Drews, a specialist for diseases of children in Hamburg, reported a series of fifty-five cases of diarrhœal affections of various kinds, in which he had derived surprisingly successful results from the use of tannigen, the new intestinal astringent. Since then he has continued his experiments, and these are completely confirmatory of his previous observations, so that he is led to regard tannigen as the most agreeable and promptly effective remedy in the treatment of acute, subacute, and chronic enteritis. The earlier the remedy was administered the more rapid its effect, the vomiting being the first symptom to disappear. It would seem, therefore, as if it exerts a favorable influence upon the mucous membrane of the stomach. After the third or fourth dose of 0.2 to 0.5 gm. to children, the evacuations assumed a firmer consistence, and on the second or third day there was a decrease in the number of stools. While formerly, however, the author continued the use of the drug after subsidence of the catarrhal symptoms, in order to prevent recurrences, he has found that by increasing the dose to 0.3 to 0.5 gm. three times daily to infants under one year, and to 0.5 to 1.0 gm. in older children, a cure was more rapidly produced and was more permanent. In the acute and chronic enteritis of adults, in colitis, and especially in the diarrhœa of phthisical persons, it also acted more promptly and efficiently than any other remedy. In two cases of typhoid fever the profuse diarrhœa was rapidly relieved and convalescence was unusually prompt. In a case of diarrhœa from auto-intoxication with numerous profuse evacuations and violent tenesmus and abdominal pains, tannigen relieved the latter after the second dose, and the diarrhœa ceased after the third or fourth dose. As the remedy is perfectly tasteless and odorless, it can be readily administered to children and adults in water, milk, soup, or bread and butter, and never provokes vomiting or any other after-effect. Another marked advantage is that it is completely innocuous, and is well tolerated by infants at the breast. Encouraging results have also been obtained by Drews from tannigen in catarrhal inflammations of the nose and throat, and it may prove a useful astringent in these conditions.

THE
DIETETIC AND HYGIENIC GAZETTE
A MONTHLY JOURNAL OF PHYSIOLOGICAL MEDICINE

VOL. XII. NEW YORK, AUGUST, 1896. No. 8

THE CHOICE OF FOOD.

BY MRS. HELENA KORTE,
Port Tampa, Fla.

IN selecting food, the criterion usually employed is a very simple one. "Is this article agreeable to the taste? Does the palate approve of it?" The question of healthful nutrition is made secondary.

In those early days, "when the earth was young," when the vitality of the race was unimpaired, the instincts unperverted, this standard was probably the natural and correct one. The second question was included with the first and answered with it. But this is far from being the case at present. There are no giants in these days. Indigestion is the bane of the race. American dyspepsia has passed into a proverb.

With the advance of civilization and the supremacy of reason, natural instincts have been forced into the background, either lost altogether or disregarded and misunderstood. Knowledge has increased. Chemistry can name to us the constituent elements of food products. We know a thousand different ways of combining them and cooking them. And Taste says of the result, "Well done."

But Taste has fallen into bad company and is degenerate. Taste is drunk on sweets and meats and condiments, and no longer knows what he is talking about. Taste, in short, is a falsifier.

Some wise folk there are who, recognizing this fact, are inclined to depose Taste altogether and trust only to knowledge and reason in selecting and preparing food. So much carbon, so much nitrogen, so much saline matter, etc.—learn to choose your food so that these elements are combined and consumed in due proportion, and the problem is solved.

But is it? If we were machines made on exactly the same pattern we might be kept in working order with the same sort of oil. But we are human beings of distinct individualities; and the homely old saying that one man's meat is another man's poison is a fact founded on the mystery inherent in human life—a mystery too deep to be fathomed by the plummet line of chemistry or physiology. Rules for the preparation and using of food have never yielded satisfactory results in general application, and probably never will.

Then if taste is demoralized, and reason an uncertain guide, what are we to do?

It is possible that taste might be persuaded to reform if brought back gradually to natural conditions. In the meantime, it might not be a bad idea to look about through the human microcosm to see if there are not yet remaining senses less perverted than taste, which stand ready to help us out of our difficulties.

As a rule, we do not realize what the natural instinct is able to do for us through the senses of sight and smell. Though not infallible, they are probably as reliable guides as we have. Both insist on perfect cleanliness in food, and we know this to be essential. Another quality of healthful food, less often considered, but scarcely less important, is purity—using the word strictly in its literal sense, meaning freedom from any admixture of foreign matter. One form of fruit, vegetable, or grain is more pleasing to the eye than a heterogeneous jumble. One distinct, individual fragrance is more agreeable than a mixture of smells.

With these senses as guides, let us examine food articles as they come to us. What is more tempting to appetite than the sight and smell of fresh, ripe fruits? That they are almost universally healthful, experience has proved. Even in exceptional, or what might seem to be abnormal cases, this sense seldom betrays. One lady found the smell of peaches so intensely disagreeable and sickening that she could not stay in the house where they were. Peaches, delicious and healthful to most people, through some strange idiosyncrasy of the physical nature, were to her a deadly poison. Instinct warned her through the sense of smell, and saved her from tasting the harmful thing. This is an extreme case, of course, but instances of the same sort might be multiplied, and through all the principle is the same.

If we acknowledge the authority of these senses we shall be led to discriminate rather rigidly against meat foods. The eye does not take pleasure in the sight of dead animals, or pieces of them. Only custom prevents actual disgust. As regards smell, has one ever had the fortune, or misfortune, to go into a slaughter-house? And can he readily forget the sickening odor and the overpowering sinking of the heart which comes when he is forced to realize the full meaning of the scene? Pass through a large city market with its booths of freshly hung meat. The effect is scarcely less unpleasant. How we hurry on, faint and oppressed, and with what relief we stop among the fruit and vegetables, where everything is fresh, sweet, aromatic, and the eye lingers lovingly on the bloom of peach and pear and grape and rosy apple, or wanders over the rows of celery, cabbage, radish, parsnip, etc., while we gain a possibly unrecognized but real refreshment from their slight, spicy fragrance.

We find also that natural instinct points more often to uncooked food as proper for human sustenance than to anything cooked, however skilfully compounded. Usually the aroma arising from cooked food is not pleasing, and a good housekeeper is careful to keep the doors securely closed while a meal is in progress, so the "kitchen smells" may not penetrate the other parts of the house.

Cooked food is seldom pure in the sense of being unmixed, and however carefully prepared it does not have the effect of cleanliness which is characteristic of most uncooked foods. The greasy, sticky messes so often produced seem very far from meeting the desire of the senses. And grease of some sort is used in nearly all cooking. Flour, eggs, butter, lard, sugar, milk, spices and dried fruits are mixed and cooked together to make dishes which we have come to consider appetizing, and even necessary, but which in reality are often only a clog to the system, the nutrition of the meal coming from the simpler, purer foods which have accompanied the mixed dishes.

Bananas, it is said, contain all the elements necessary to support human life. In the natural state they are clean and pure in appearance, and almost universally liked. Disguised in greasy fritters on a hotel table, they appeal to neither sight, smell nor taste—if at all natural—and no one can claim that they are healthful in this form.

What do we see more clean, pure and tempting than a tender stalk of fresh, white celery? Doctors recommend it as having a great virtue as a tonic for the nerves. So far, no one has made any serious attempt to cook it. And everybody enjoys it as nature intended. By and by, some famous *chef*, in search for variety for his epicurean patrons, will invent a celery *paté* or something of the sort. His lead will be followed by some of the lesser "artists." Celery will be defrauded of its true career of usefulness, and we shall be the losers.

The testimony of the senses on this point is significant. To many, no doubt, the idea is somewhat startling. The primitive man undoubtedly lived without cooking his food. The finished, perfect man may do the same. I am not prepared to say that the man of the nineteenth century should or could do so. It is certain, however, that we have too much cooking and compounding in our diet, too little that is natural and pure. Experience shows that the nearer we can retain the primitive condition of the food created to sustain our bodies in health and vigor, the more surely is that object attained.

Take some of the staple articles of diet—the potato, for instance. There are various ways of cooking it, but in no way is it so clean, fresh and appetizing as baked or roasted in its skin, fragrantly steaming and snowy, as it breaks open on the plate, satisfying three senses at once.

In bread, also, what do we find? There are many compounds called bread—rolls, biscuit, gems, muffins, buns, etc.—made up with butter, or lard, sugar and spices. But the healthy stomach soon tires of these, the unhealthy sickens, and both demand bread pure and simple, bread which bears the closest relation to its parent, wheat, without more mixing than is absolutely necessary to bring it into light, nutty loaves of convenient size. In no other form can bread be truly called the staff of life, because in no other form can it be safely depended on.

The people of a great nation cannot be properly nourished on general rules. But every person has natural instincts and senses through which they may act. They should be consulted and trusted more than is usually done.

SALIVARY INDIGESTION.

By J. W. Riecke, M. D.
Grand Rapids, Mich.

Man partakes of food to supply the waste which continually takes place in the system. The foods required are of two kinds—one an animal or nitrogenous, the other a vegetable or starchy food. That these foods become properly converted so they can be assimilated, is of great importance. As the food that man partakes of is twofold, so also is the process of digestion a twofold one. The vegetable or starchy foods require an alkaline condition, while the animal or nitrogenous foods require an acid condition, to reduce them to a soluble state preparatory to assimilation.

The digestive system is divided into three compartments—the mouth, stomach, and intestines. In the mouth we find the teeth, saliva, etc. The teeth divide the food into small particles so that it can be more easily swallowed, and also carry the saliva with them into the food so that it becomes thoroughly incorporated. The teeth form a most necessary part of the digestive system, and should be kept in a good state of preservation. The saliva is an alkaline fluid and is derived from the four principal pairs of salivary glands, the parotid, submaxillary, sublingual, and intralingual; it contains an active principle, ptyalin, which converts starch into dextrose. The conversion of starchy foods into dextrose and maltose is the beginning of digestion. It no doubt has occurred to all that crackers, bread, or potatoes—amylaceous foods—although not sweet in themselves, become so when masticated and thoroughly mixed with the saliva, and that they become sweeter the longer this continues.

After the food has been thoroughly masticated it passes on to the stomach and here meets with the gastric juice. It is at this stage of the process that the animal foods are converted into peptone. During the half or three-quarters of an hour which intervenes between the swallowing of the food and the production of a degree of acidity sufficient to prevent the action upon the starch, through the appearance of free hydrochloric acid, very active conversion of starch is taking place. The presence of the saliva in the stomach causes an increased activity of the glands of that organ, whereby an abundant supply of gastric juice is produced. If the food has been thoroughly masticated and the saliva abundantly supplied, the greater proportion of the starch elements will be rendered soluble by conversion into dextrose and maltose, and the nitrogenous elements liberated which may then be acted upon by the gastric juice.

The food then passes on to the duodenum, and here starch which has passed unchanged or has been only partially converted is further acted upon by the juices from the pancreas and Brunner's glands and the biliary secretions. Albumen is also acted upon by the juice from the pancreas, and the fats of the food are split up into fatty acids and glycerin by the pancreatic juice. Any irregularity or fault in the process of digestion as above described soon becomes manifest, and dyspepsia, malnutrition and ill-health follow.

That the American people consume starchy foods in large quantities cannot be denied, and from this it is evident that they become largely exposed to amylaceous dyspepsia. Foreigners often remark that we eat too many farinaceous preparations (*Melhspeisen*), and are not at all surprised to learn that we are subject to so many digestive disturbances. One-half the weight of these farinaceous food products is starch, which should be converted into sugar in the process of digestion. The presence of sugar in large amount hinders the action of the saliva; but still we add sugar freely to sweeten these foods—which is not only physiologically absurd, but highly injurious. In this manner sugar, preserves, sweet sauces, confectionery, ice-cream, cakes and all sweets are in the highest degree conducive to salivary indigestion.

Rapid eating is another fruitful source of salivary indigestion, because the food is not thoroughly masticated but is swallowed more or less undivided. This prevents the saliva from being intimately mixed with the food, and allows starch to remain unconverted and pass into the stomach. Even at this stage of the process, if the saliva were present an active conversion of starch would take place, because the condition of acidity sufficient to hinder it is not found for some little time after the ingestion of the food. The majority of rapid eaters have an additional fault, that of partaking of liquids to moisten each morsel. This habit of moistening the food by drink prevents the saliva from being called forth, as the natural stimulus to the flow of the saliva is the presence of the dry food in the mouth.

Ice-cold drinks or foods which lower the temperature of the mouth and digestive organs are also very prominent factors in the production of salivary indigestion. Iced tea is very injurious, for two reasons: first, on account of the low temperature; second, on account of the tannin contained in leaf tea.

It is also physiologically absurd to partake freely of strong acids, such as vinegar, in connection with vegetable foods. Nothing could be more injurious than the combination of a large amount of vinegar with vegetable foods—as pickles with potatoes, etc. The acid may be sufficient to neutralize the action of the saliva upon starch, hence the fermentation that so often follows the ingestion of acid fruits.

The consequences of salivary indigestion are: acid fermentation, heartburn, gastric and intestinal colic, dilatation of the stomach, catarrh of the stomach, and many other conditions arising from these.

In the treatment of salivary indigestion it becomes necessary, first and foremost, to order the food thoroughly masticated, and to prohibit the use of an excess of liquids, sugar and acids. This having been done, we must supply some amylolytic ferment to assist the weakened organs; and for this purpose, we will find Taka-diastase a most valuable remedy. It should be given just before meals or immediately afterwards in one or two-grain doses.

Capsules, each containing 2½ grains of Taka-diastase can be conveniently carried in the pocket and taken with the early part of the meal. Large doses produce nausea and catharsis. I have prescribed it in a number of cases, some of long standing where every possible means of relief had been given a trial, and it worked magnificently.

Case 1.—This patient, a man 40 years of age, had suffered for six or eight years. He had always eaten starchy foods, sweet pastries, etc., in large quantities; he was a rapid eater and used liquids freely with his meals. As a result of his imprudence, he soon noticed symptoms of distention, epigastric pain, constipation, nausea, frontal headache, and, after some time, emaciation. He applied to me for relief, for life was becoming a burden to him. I instructed him in the manner of eating, and prescribed Taka-diastase five grains three times a day, immediately before meals. In a short time he returned and complained of more nausea than before, and of diarrhœa. I then ordered the dose reduced to two grains, and from that time he began to improve rapidly.

Case 2.—A married lady, aged 26 or 28 years, applied to me for relief from an obstinate constipation. On investigation I found that after meals she suffered from gastric distention and epigastric pain, eructations, and frontal headache. I gave the necessary instructions and prescribed Taka-diastase in two-grain doses three times a day, after meals. After a short time her constipation began to abate, and she recovered from the other symptoms so that now her digestive organs are in excellent condition.

Case 3.—A lady, aged 77 years, consulted me on account of a stomach trouble. She was constipated, distress after food, vomiting, had epigastric pain and frontal headache. I gave the usual preliminary instructions and prescribed Taka-diastase. She has since eaten with impunity what before she did not dare touch.

Case 4.—A lady, 45 years old, applied to me for relief from frontal headache, distress after eating, constipation, acid eructations, borborygmus, and a peculiar skin disease similar to urticaria. I prescribed Taka-diastase in 2½ grain doses and obtained excellent results; even the skin trouble has greatly improved.

Case 5.—A German, 21 years of age, who had been in this country three years, applied to me for relief from constipation, epigastric pain, distress after eating, frontal headache, and drowsiness. He had never had any stomach trouble before; digestion had always been good until he had been in this country about one year. I prescribed Taka-diastase, and improvement promptly followed.

Case 6.—A young lady, 24 or 25 years old, of very nervous temperament, complained of constipation, frontal headache, sour stomach, acid eructations, and epigastric distress. I prescribed Taka-diastase, and she has been greatly benefited.

Case 7.—A young lady, 23 years old, called upon me for relief from headache, constipation, acid eructations, and vomiting after eating. I prescribed Taka-diastase, with the best of results.

Case 8.—A married lady, aged 30, who had been greatly annoyed by a stomach trouble for years, consulted me concerning flatulence, borborygmus, distention, distress after eating, drowsiness, and acid eructations. I prescribed Taka-diastase in one-grain doses and obtained most gratifying results.

Case 9.—A traveling agent presented himself with prominent symptoms of salivary indigestion—frontal headache, drowsiness, eructations, and distention. I prescribed Taka-diastase, and now he is entirely well again, able to eat anything.

DEGENERATIVE HEREDITY, OR SOME DEGENERATIVE INFLUENCES OF MODERN CIVILIZATION UPON HEALTH.*

By CHARLES DENISON, A.M., M.D.,
Denver, Col.

FIRST PROPOSITION.

The advance in the healing art, in so far as the saving and prolongation of life is concerned, suspends the law of natural selection, and permits the weak to propagate their kind.

THE FACTS of heredity need no demonstration in this enlightened day and generation; they are the common place of knowledge. Grant Allen gives the Weissman theory when he declares that "what man is, he is already potentially at birth; whatever little can be added by himself is at best but an infinitesimal fraction, compared with what he derived directly from his parents, or indirectly from his earlier ancestry." The peculiarities of offspring, and their similiarities to their progenitors, are expected to appear, not only in kind but at the times or ages when pre-existent in the parent. So much is this the case with all characteristics, that Darwin proclaimed their inheritance as the rule, and their non-inheritance as the anomaly. The facts are undisputed, but the peculiarities and vagaries of inheritance remain unexplained, notwithstanding the intense interest the subject of heredity has always excited in all enlightened communities. Science has not yet satisfactorily elucidated the reason why a generation is skipped in the manifestation of certain characteristics in one instance, and the inheritance is direct from the father or mother in another; or why characteristics inherited seem to cross from father to daughter or mother to son, or come from one parent to both sons and daughters.

DeCandolle's researches show that distinctive traits are oftener transmitted from the father than from the mother, especially those pertaining to the higher faculties; while some investigations of my own, over twenty years ago, based upon the opinions of many medical men, strongly indicated that physical states (tendencies to disease) were oftener contributed by the mother than by the father.

But the awful responsibility of heredity, when considered as perpetuating and even doubling diseased tendencies in the offspring, is the particular phase of this subject which now demands our attention. The question is of far greater importance than the prevalent apathy and the blind fatalism and sentimentality extant, as to the passion of love, would seem to indicate. If there is anything in the old adage, "Love goes where it is sent," then it is indeed possible that a sensible enlightenment of marriageable young persons as to the dangers of disease inheritance might do much good, and the anxieties and fearful disappointments of tainted alliances be thus avoided.

It is with no disrespect for religious beliefs or the dictum of the pulpit, or any special antagonism to authors of fiction who deal in sentiment and expound social customs, that I, a physician, seek to have this question considered from the scientific standpoint of evidence, the results of the observations of natural laws. Admit, if you must, that sentiment and theory are subverted and ignored by the cold facts required in a physician's logic, there is at least a good basis of truth in his conclusions and it is to these truths with regard to the heredity of disease, especially the tendency to or aptitude for tuberculosis, to which your thought is invited.

The inherited diseases are considered to be goitre, leprosy, gout, scrofula, tuberculosis, cancer, syphilis, rheumatism, eczema, and the neuroses such as epilepsy, insanity, chorea, hysteria, and asthma.[1]

---

*Jour. of the Am. Pub. Health Assn.

The taints of gout, leprosy, and cancer are more general than their actual manifestations indicate, because, coming as they do in old age, the predispositions thereto may not have had a chance to show themselves in those dying of acute disease. The neuroses seem to be correlated, *i. e.*, the inheritance may or may not be of the same kind in the offspring. So also, it seems to me, are cancer, scrofula, tuberculosis, and malaria, at least in the actual manifestations of these diseases. Malaria seems to have a very intimate relation to tuberculosis; cancer, according to my records, certainly, predisposes to tuberculosis in the next generation; and as for scrofula, the diagnostic powers of tuberculin show this glandular condition to be tubercular oftener than was ever suspected before Koch discovered that agent.

The power to resist disease is an inherited gift which ought to be recognized more than it is, and the same can be said of the unusual susceptibility in some families to certain contagious diseases—so marked in the mortality records of scarlet-fever, diphtheria, whooping cough, and measles. The composite biology of the offspring is unable to resist, or actually intensifies, the morbific influences of these dread infantile diseases, and an infant mortality results which greatly modifies any rule for determining the excellence or failure of family strains. This peculiar characteristic I shall presently make use of in a rule I will attempt to formulate, because I believe that an individual's susceptibility to, or natural opposition to, disease is almost always an inherited proclivity, and that, too, in no small degree. While all our human evidence—and I can here present only a small part of it—points in the same general direction, I will first ask you to go aside with me to briefly examine the striking proofs furnished in the high breeding and in-breeding of animals.

Nature's law is always in favor of harmonious development; this is the acme of success. The human race can learn much from this the only kind of success Nature will stamp as permanent in the breeding of animals. It is really inharmonious development that the breeders of cattle are now obtaining in the fatal degeneration which they are introducing into their high-bred families. It makes no difference whether it is for increasing the quality and quantity of milk given, as in the extreme types of the Jersey or the Holstein, or for the weight and fattening proclivities, as in the Shorthorn or Galloway; it is the breaking of a natural law by the constant doubling of like strains, which leads to degeneration. This high-breeding becomes practically the same as in-breeding, a similarity which, by the way, could be pointed out as well in the human family, if time permitted.

Dr. Greswell, the very capable state veterinarian of Colorado, says that intense breeding in any direction in animals produces not only this degeneration, but eventually sterility as well. His has been no common experience in this line, and convinces one that high-breeding is not only synonymous with in-breeding, but the latter is synonymous with scrofula, and this in turn is synonymous with and surely leads to tuberculosis, which finally is the doom of every high-bred herd. Dr. Greswell makes the statement advisedly that if the tuberculin test were allowed to decide (and he esteems this test superior to all others), "not a noted family of (1) Jerseys, (2) Shorthorns, (3) Devons, (4) Holsteins, (5) Herefords, (6) Guernseys, or (7) Galloways could remain." He speaks of them, not as individuals, but as families of the highest grades, the majority of which would be condemned. He further states that in the United States even 28 per cent. of full-blood Jerseys would succumb to this test; while in England the ratio would be 35 or more out of every 100. Is it then so very strange that the influential owners of these over-bred strains in England, and to a certain extent their associate boomers in this country, make common war against such a splendid test, and will not allow it to be used in their herds? The pecuniary loss would be enormous if the truth were to be known! This is a serious question, which we have not time here to consider, if, indeed, it is true, that the queen milkers of the world, the Jerseys, are thus contaminated with tuberculosis! That this is the direct result of high-breeding and in-breeding is likewise shown by the experience with the Shorthorn family for beef purposes. Crowded feeding and intense in-breeding here give a great activity to the conversion of food into blood; the red corpuscles do not have time to form, and the white corpuscles are found to be much increased in size and number. A weakened blood state is thereby created, which is most favorable to the invasion of scrofula and tuberculosis. This process is pushed sometimes to the point that the overcrowded blood vessels rupture in the brain, and death puts a stop to the scheme.

---

[1] Organic heart disease, diabetes, emphysema, haemophilia, lithiasis, and color blindness are thought to hold a secondary position as to the probability of inheritance.

NOTE. Dr. Greswell describes such an instance in England, where, after the death of two calves, the progeny of a brother and sister of a noted Shorthorn family (and these the result of a like in-breeding for two generations back), he succeeded in keeping a third, a bull calf, alive by repeated bleeding and the use of digitalis, and finally by the aid of three foster mothers the fellow was reared, and at one year of age was sent to Australia weighing over 1,200 pounds.

Such fruitful soil for tuberculosis created in dumb beasts finds its analogue, as we shall presently see, in the highest ranks of the human family, where, it would seem, there ought to be good sense enough to prevent it. To be sure, the law declares that the sins of the fathers are visited upon the children to the third and fourth generation. Yet, because there is a specific cause in the germ of tuberculosis, not a few people discredit the general belief, previously held, of the hereditability to this disease which probably has to do with a fourth or more of the world's mortality. A dozen illustrations selected from a couple of hundred of any cases of tuberculosis, taken at random, ought to convince the most sceptical on this point. For instance:—

1. Male, seventeen, mother had three children, and died at forty-three of consumption when this patient was nine. One of these children, a sister, died of consumption at seventeen.

2. Male, nine, an only child of a possibly tuberculous mother; one of a family of seven children, four of whom had died of consumption; and the father, one of a family of nine, five of whom died of the same disease, and the father died of phthisis when this patient was two months old.

3. Female, twenty-six, mother died of consumption, also patient's two sisters and a brother; another sister is insane, and the majority of a large family (ten) died young.

4. Male, thirty-eight, mother died of consumption at fifty-five, also her father and her two brothers and a sister; father's mother also.

5. Male, thirty-three, mother died of consumption; out of her eleven children four are living; and three brothers and a sister have died of the same disease.

6. Male, thirty-five, mother and father cousins; five out of eight children died young.

7. Male, thirty, mother's father and mother were cousins; father and mother are healthy, but six out of eight of their children died from fourteen to thirty of consumption.

8. Male, twenty-eight, mother and father cousins and now well; family intermarried for three generations; five out of patient's eight sisters died of consumption.

9. Female, twenty-six, out of four children, sisters, two have tuberculosis and other two have died of it. Mother died of "tumor of the liver" at sixty-four, and three out of six of her brothers and sisters died of consumption.

10. Female, twenty-four, father died of consumption at thirty-four, and three out of his children died of same disease; nine in father's family, and all died before thirty, much like father.

11. Male, twenty-three, father and mother both died of consumption; father had hemorrhages at twenty-one and died at forty-two when this patient was seven; mother was weak and small, and died eight months after his birth.

12. Female, twenty-three, father died of cancer at sixty-three, mother of consumption at fifty-three, and two sisters out of six children died of consumption.

Averaging the last 1,000 of my tubercular cases seen, extending back about six years, I have the following results to present: Inheritance, 38 per cent.; non-inheritance, 62 per cent.; of the former, 40 were cases of either extreme or double inheritance; while of the latter, in 20 there was almost positive proof of infection, as when a husband or sister was nursed by the patient.

The large percentage in the hereditary class (38) should be explained as due to the many factors allowed in indicating a family tendency, viz., if a father or mother, or two or more of either aunts, uncles, or grandparents, or two or more of brothers or sisters, died of consumption.

Dr. J. E. Pollock's analysis of 1,200 cases, giving inherited tendency in a little over 30 per cent., undoubtedly did not include any record of the brothers and sisters. See "The Elements of Prognosis in Consumption."

Dr. Austin Flint, Sr. ("Phthisis," page 73), found in 220 cases of phthisis a ratio of 24 per cent. in which what may be considered positive inheritance existed.

Dr. Walsh ("Diseases of the Lungs") found that in 26 per cent. of his consumptive cases one or both of the parents had died of the disease.

One thousand and ten cases of the Brompton Hospital Report included only parents, and gave an average of 24.4 per cent.

Dr. Cotton's 1,000 cases, mentioned by Dr. C. Theodore Williams in his work on "Pulmonary Consumption," included parents, brothers and sisters, and gave 36.7 per cent.; while Dr. William's own list of 1,000 cases gave 48.4 per cent., but his estimate included cousins and a single brother or sister; while in my list I have required two of the latter only, or of uncles or aunts or grandparents, to establish a family tendency. Dr. Williams concludes:—

1. Family predisposition prevails among and exercises a more decided influence on females than males, and the former have a greater power of transmission than the latter.

2. Fathers transmit more frequently to sons, and mothers to daughters than the converse. Paternal inheritance, whilst most unfavorable for the males, is less so for females, as it generally includes an increase of resisting power.

3. Maternal inheritance is unfavorable for both sexes, and most so for the males.

4. Double heredity exercises the greatest influence, and affects sons more strongly than daughters.

5. Family predisposition does not directly shorten the duration of the disease.

6. It precipitates the onset of the disease, and this shortens the duration of life.

This evidence is corroborated by the experience of such distinguished specialists as Dr. J. E. Pollock, Dr. Austin Flint, Sr., Dr. Walsh, Dr. Cotton, Dr. C. Theodore Williams, and Dr. Edward Smith of London.

NOTE. Dr. Edward Smith, of London, analyzed 1,000 cases of consumption as to inheritance, and found, of 600 males and 400 females, there was inheritance in about 24 per cent., and these patients were members of large families, averaging 7.5 children to the family. Of these children 40 per cent. had died, and of the married patients' children 38 per cent. had died, which, considering the average age of these patients at time of inquiry, viz., 28.8 years, are unusual percentages. In 43 per cent. the general state of the health of these consumptives' children was bad, and abortions had occurred in 46 per cent. of the patients who were child-bearing married women. Aside from the evidence adduced that these patients had been born feeble and had feeble and short-lived children, it was further conclusively shown that a large majority—70 per cent.—had suffered from the effects of injurious occupations, and many had been injured by the anxieties and immoralities of life. In fact, as usual with this class, they were an unpromising lot to propagate from, and, in many instances, so were their progenitors.

It is thus true that heredity, which I believe is underestimated in our usual calculations, plays an important part in the dissemination and perpetuation of tuberculosis. I do not attempt here even to discuss the possibility of a direct transmission of the bacilli of tuberculosis through the ova or spermatozoa. This much we are sure of, that there is a transmission to offspring from parent or parents of a remarkable susceptibility, and of peculiarities of blood and vitiated vitality, which furnish the required pabulum or field for the growth of that microbe. The soil and conditions under our present civilization are constantly made more favorable for the development of the disease, while our ability to combat it is also increased under our advanced knowledge of its etiology and arrest. But with all our splendid climatic and other advantages, arrest is not the eradication of the disease; on the contrary, the total hereditary influence is necessarily increased, because more affected persons survive. Undoubtedly the increasing average of longevity of civilized people is in no small degree due to the prolongation of the lives of chronic invalids.

Thus it becomes an open question, Do not the valetudinarians equal the healthy in longevity? Consequently it results that Darwin's law—the survival of the fittest—

is in danger of becoming obsolete; while the total of bad inheritances is in no sense lessened. The vicious seed is not destroyed, but preserved to be again mixed with the good. "Like begets like," only more so in the case of these recovered consumptives; and it becomes a serious problem how a community like that in Colorado, largely made up of recovered invalids, will be governed in future, that a normal state of health may be assured to her inhabitants.

SECOND PROPOSITION.

The present civilization stimulates the intellectual and nervous system to such an extreme as to injure the physical (reproductive) powers and favor sterility.

Man, more than any other animal, is made by his environment, because, more than any other animal, his capabilities for influence therefrom are greater. The most distinctive characteristic of man, as compared with animals, is emphasized in effective language by Henry George in his "Progress and Poverty": "He is the only animal whose desires increase as they are fed; the only animal that is never satisfied. The wants of every other living being are uniform and fixed." The only use other beings "can make of additional supplies or additional opportunities is to multiply. But not so with man. No sooner are his animal wants satisfied than new wants arise." Man parts company with the beast when the wants of food, shelter, and the gratification of the reproductive instincts are satisfied. Then his evident destiny is away from and above the beast; it is no longer quantity which is man's incentive, but quality. "The very desires that he has in common with the beast become extended, refined, exalted. It is not merely hunger, but taste that seeks gratification in food; in clothes he seeks not merely comfort, but adornment; the rude shelter becomes a house; the indiscriminating sexual attraction begins to transmute itself into subtle influences, and the hard and common stock of animal life to blossom and to bloom into shapes of delicate beauty. As power to gratify his wants increases, so does aspiration grow."

This mastering incentive to excel, admittedly the source of improvement of the race in refinement and power, is nevertheless undoubtedly a principal cause of the decadence of that race in physical well-being. There is a weakening at the top, portending the not distant extinction of that quality, unless it be constantly replenished from the lower orders of the race.

In the social world the unfortunate demands of caste, and the appreciated cost of the honors and responsibilities of parentage,—each generation seeking to outstrip its predecessor in the comforts and refinements of life,—too often furnish excuses for a celibacy or a state of immorality which deprives the earth of what ought to be, under more favorable circumstances, its most prosperous increase. In the intellectual world the same incentive to excel, the demands of time and study necessary to proficiency in professional life, furnish further and additional excuses, with those who do marry, for a delay in assuming the responsibilities of parentage, till the total effect can be seen to be the gradual extinction of these higher classes.

Kidd, in his "Social Evolution," nicely illustrates this loss of productive years through delayed marriage among the intellectual classes, and seconds Dr. Ogle in his conclusion, read before the Statistical Society of London, in March, 1890, "that the lower the station in life, the earlier the age at which marriage is contracted, and the difference in this respect between the upper and lower classes is very great indeed." Galton, in his "Hereditary Genius," makes a comparison of one class of men who marry at say 22 years of age and another at 33, the latter presumably representing those in professional life, and shows that, allowing for the usual progeny which would be expected from such differences alone, the former class in a single century would increase two and one half times over the latter. In two centuries the progeny of the first class would six times outnumber the second, and in three centuries more than fifteen times.

The exact figures as to the average marriage age of different classes are given in the English census, for miners 24 and of their wives 22½ years, while the ages for the professionals and independent class are seven years more for the husband and four years added for their wives. Here is an actual difference considering the few in the upper compared with many in the lower grade, which is a positive proof of the numerical weakening of the intellectual class.

This argument is independent of one probably equal in its importance (could all the facts with reference to it be presented), viz., that the shirking of the responsibilities of motherhood is successfully carried on to a probably much greater extent among the higher than the lower orders of civilization. The tendency to sterility is greater independent of the above, as will be inferred later on. Again the proportion of permanent bachelors among the professional and independent classes, as found by Dr. Ogle, is far above the rest.

This all serves to conform the true statement of Royce, in "A Study of Genius," that "mental exertion restricts the reproductive energy." This tendency to degeneration and to consequent race extinction among those classes devoted to advanced intellectual pursuits, is by no means a peculiarity of sex. That women are not exceptions to the rule is shown by the remarkable paucity of healthy children born of members of high-class women's debating and literary clubs, as well as of authoresses, lecturesses, and female physicians.

The practice in England of purchasing a title by heiresses, reveals a remarkable tendency to sterility in those high-born females. Of course, according to English law, they must have usually been the only child in order to have inherited; and the physical degeneracy of their noble parents shows itself in their own inability to continue in existence either the strains of their own families or that of their purchased peers. Galton ("Hereditary Genius"), remarks this tendency and concludes: (1) out of 31 peerages there were 7 in which the hereditary influences of an heiress or a co-heiress affected the first or second generation; that in 16 out of 17 peerages their influence "was sensibly an agent in producing sterility;" (2) that the direct male line of no less than 8 peerages was actually extinguished through the influence of the heiresses and that 6 others had very narrow escape from extinction, owing to the same cause. Out of 12 peerages that have failed in the direct male line, no less than 8 failures are accounted for by heiress marriages; finally that 100 marriages of heiresses resulted in an average of 4 children born to the family, while to 100 peers not married to heiresses the average per family was over 6. This evidence of degeneration is the more striking in view of the great incentive to these peers to perpetuate their line through a male offspring. How subtle are these proofs of the destiny which awaits that class which ignores the laws of Nature.

When we come to consider the lives of those in positions of power and influence, chiefly because of wealth, the evidence of this law of decadence is not less startling. We do not have to go back to the Roman Empire when the Romans under Cæsar created from the plebeians a competent number of new patrician families "in the hope of perpetuating an order which was still considered as honorable and sacred."

Says Benjamin Kidd: "The existing aristocratic families amongst the modern European peoples are continually undergoing the same process of decay. The manner in which the English aristocracy (which has been to a large extent recruited from those who, in the first instance, attained to the position by force of character or intellect) is continually dying out, has become a commonplace of knowledge since the investigations of Galton, Evelyn, Shirley, and others threw light on the subject. Only 5 out of every 500 of the oldest aristocratic families in England at the present time can trace a direct descent through the male line to the 15th century." In France and in all other countries where there is an aristocratic class, the same state of things is known to exist. There is something radically wrong about aristocratic and plutocratic life. Perhaps it is the greed and pride engendered by wealth and power that invariably leads to this decadence by extinction which Nature imposed upon those classes and systems existing in contravention of her laws.

THIRD PROPOSITION.

The social, commercial and manufacturing phases of our civilization favor indoor and effeminate modes of life which are detrimental to successful development, and inheritance propagates the depreciated life-force.

The changes in the economical conditions of our times, compared with those of 50 or 100 years ago, are too well-known to need more extended proof. These changes are particularly noticeable in the size of the family and the employment of its members. For instance, take the history of any family, and where are the representatives of those who constituted an industrious household in old New England times? As to numbers, according to a genealogy I have in mind, the families of eight to twelve children, nearly all hardy representatives of the agricultural or professional classes, have dwindled down in six generations to from one to five members per family, and one-half of these devoted to clerical or indoor occupations. Then society was made up of the producing and the professional classes. Now the growth of invention, the multiplication of machinery; and the centralization of mechanical industries in the cities have built up a vast middle class, between the agricultural and the professional, who far outnumber the others. Referring to the statistics of the last census (1890), and classifying those engaged in what may be considered as outdoor occupations in contrast with all others, we have the following result: Agriculture, fisheries and mining, about 9,000,000 souls; professional service, domestic and personal service, trade and transportation, manufacturing and mechanical industries, about 13,700,000. In how many offices, shops, or factories, the clerical force and the detail toilers many times outnumber all others connected with those establishments? There is then much more of confinement to indoor life, whether in sweat shop, factory or counting house, and long hours, cramped positions, and jaded nervous systems, help to constitute and establish a defective parentage, if, forsooth, marriage is consummated at all.

FOURTH PROPOSITION.

The independence and self-supporting of women in clerical positions removes from the probability, if not the possibility, of successful motherhood, a considerable portion of the so-called gentler sex, through the resulting great decrease in matrimony and the exhaustion of the vital powers of women in nerve-taxing occupations.

It is not merely that there is an increasing disinclination of intelligent women to take upon themselves what to the "new woman" are the unappreciated honors of motherhood, nor solely that under the fostering influence of female suffrage women are encouraged to assume the prerogatives of men and drive them from many clerical duties the women can confessedly perform just as well; but the tendency of social life and business economics is toward making way for the employment of women in business circles, and granting to them the gratification of their new ambition—their so called "enlarged sphere." One needs only to compare the records upon this point of the census of 1890 with that of 1880, to see the force of this argument. Of those engaged in all business occupations tabulated, the males increased 27.6 per cent., while the females so employed increased 47.9 per cent., or, to specify classes of occupations, under professional service, males increased 48.5 per cent., and the females recorded 75.8 per cent. increase. Domestic and personal service, males increased 16 per cent., females, 41.2 per cent. Trade and transportation, males increased 71.7 per cent., females, 263.2. Manufacturing and mechanical industries, males increased 46 per cent., and females 62.9 per cent.

The curse of child labor, too, early "breaks them into" lines of confined and wearing occupations, depriving young girls of needed schooling and physical development which would otherwise fit them for maternity.

Considering the chief and most enduring function of women to be the bearing and guidance of the young, what a large class of them fall short of this, their created purpose, to the extent that they are simply passing incidents of the world in which they had lived! These healthy, independent women are, however, better suited for motherhood than those who are left to take their places. Civilization has to fill innumerable gaps and start new genealogies from baser materials.

It is a question of quality of offspring, not quantity; no argument in favor of increasing the population of the earth is intended; but it is desirable that the most civilized peoples of the globe should hold their ground and not be crowded out of existence by their failure to comprehend Nature's laws.

Evidence sufficient could be adduced, did time permit, that the ancients were wiser in selecting the fittest to live and become citizens than we, of this sentimental and unsystematized age. There is only time now to mention the claim of such writers as Galton, Lecky, Kidd and Gladstone, that intellectual power was actually higher in Grecian times than in our own.

FIFTH PROPOSITION.

The present unaided efforts of natural selection should be supplemented by warning the young before matrimony; the masses ought to be educated physiologically that the laws of heredity may be understood, that physical development and mental strength may be appreciated, and the responsibilities of parentage recognized. The state and the nation have a duty to perform.

Dr. Smith, of Greencastle, Ind., asks these questions, "Cannot science be made to aid or even displace sentiment in mating the sexes? Would men and women love each other less if they knew each other to be anatomically perfect? Is it necessary carefully to conceal from lovely woman the chief reason for which God created her, until after she is married and has the fact suddenly thrust upon her mind that she has made a mistake which can never be corrected? Should we not use the same intelligence that the breeder of stock or the horticulturist uses?"[1]

There is very little question in my own mind how the great majority of the medical profession would answer these queries, and were it not for our servitude to the very sentimentalism we deplore and our deference to custom, we would organize to put in effect the reforms needed. As it is, the question is now before us and must be met. Its importance is foreshadowed in the words of Alexander Walker when he says, "Improvement of their race will be the prerogative of the highest minds, and will be more eagerly sought for than ever was the improvement of the inferior animal breeds." The question is a vital one to every human being, and if not recognized to be so before marriage it surely will be afterwards. Let it be argued that "love will find a way" to defeat the will of science and continue to disregard Nature's laws. What of that? The great mass of young people do not know, or cannot comprehend, the import and responsibility of marriage. They mean well enough, but they have not been properly educated in this matter. Only put before them in convincing manner the knowledge of physiology and heredity, with proper rules for the selection of their partners in life, and such instruction will be gratefully received and in many instances conscientiously acted upon. Right here is where the greatest want will be felt—namely, the need of proper literature on this subject for such young people. So far as my knowledge goes there are no works extant in the English language which fully answer the required purpose. They are too apt to expound useless generalities, with a seeming fear of telling too much of scientific truth, or going to the other extreme, which is worse, and appealing to sensuality. What is wanted is the unemasculated, scientific truth, given in plain, honest language, so there is no doubt as to its meaning. The nearest to such a book I know of is Alexander Walker's "Intermarriage," or "The Mode in Which, and the Causes Why, Beauty, Health, and Intellect Result from Certain Unions, and Deformity, Disease, and Insanity from Others."[1] The gist of their work is the announcement of a law of nature that, when the sexes are in their highest vigor and perfection, "it is the male that predominates in giving the locomotive system, character, and shape, to progeny, and it is preferable that the female should give that system, the vital, which in her is always most developed." Thus, according to this authority, we have "two series of organs, on which both life and locomotion respectively depend, in two opposite successions and combinations, variably in beings of the same variety, and invariably both in different varieties (crosses) and when closely and long restricted to one family" (in and in-breeding).

---

[1] "Influence of Heredity in Producing Disease and Degeneracy. The Remedy."

It is not the purpose here to expound the "law of opposites" in the selection of partners in marriage, in order that the best results may accrue in happiness and offspring, nor to explain the many limitations to this law, as when extremes meet in the intermixture of races. (N. B. The lack of resistance to disease in mulattoes and their great susceptibility to consumption). I should, however, consider my essay incomplete if I did not formulate from my own considerable professional experience some *rule of choice* which will help these young people to steer clear of those unions which result in tuberculosis of progeny.

Not to make any effort in this direction would be to do myself and my convictions an injustice, when I attempt to pronounce upon the criminality of those people who will knowingly bring an innocent soul into this hard life handicapped by inherited disease or weaknesses.

Let us throw around the sacred rites of matrimony more safeguards against the pitfalls of entailed suffering, both mental and physical.

Let it be considered, please, that the rule I submit is not only not exactly perfect, but limited in its scope. It is only submitted as better than none at all, and so entitled to allowance for its crudeness and perhaps some credit for its originality.

RULE FOR CHOICE OF PARTNERS TO AVOID CONSUMPTIVE OFFSPRING.

Find the proportion of all the mother's and father's married brothers' and sisters' children born (*i. e.*, the party's parents' uncles' and aunts' children) who were living at five years of age.

1. Then, excluding deaths wholly attributable to accident, or having nothing to do with disease, if less than eighty per cent. of such children were alive at that age, there is reason to suspect a weak strain in that lineage.

2. If less than sixty per cent. of such progeny were then alive, there is strong proof of such degeneration.

3. Add to this, or consider it separately, that either the party's mother or father or any two of his or her grandparents, uncles, aunts, brothers, or sisters died of consumption, cancer, or scrofula, and the proof of some defective biology in that family strain is still more evident.

4. Add to this the party's health not good, even so little defective as "never very robust," or now flat-chested and underweight, then his or her outlook for matrimony should be much impaired.

5. Double this tendency to degeneration by uniting two family lineages equivalent to (3) on one side and to (4) on the other of above described limits, and a sin will be committed by such marriage only second to the marriage of a healthy person to an invalid in active tuberculosis, which latter

---

[1] Lindsay & Blakiston, Philadelphia.

should never be consummated under any circumstances.

If time permitted, many conditions might be mentioned which would intensify the gravity of this reckoning, as, for instance, by a strain of insanity, intemperance, or scrofula, existing in progenitors' families, or the concomitant conditions, such as poverty and a climate favoring consumption inseparable from the contracting parties' lives. Of course any rule is arbitrary and may perhaps be favorably modified, as, with the first (1) and second (2) of above classifications, if the grandparents and parents are living and of good age, or the children born average five or more to the family, or if the possible contracting parties are of opposite temperaments and physiques.

Let Nature, through her known laws, speak in these warning tones to the young man selecting a partner for life: You may be an Apollo in form, and have an ancestry of centenarians, but you will have great cause for regret if you marry a girl of consumptive lineage who has weak digestive and vital organs; and to the young woman likewise— you may be a Venus in form, and the loveliest woman in the land, but if you sell yourself to a brute of a man, gross and intemperate, though high in wealth and station, his degeneracy may beget from you an idiot child, or if, through your superabundant sentiment and sympathy, you marry a consumptive invalid, you may not only become infected yourself, but you will perpetuate the curse in your offspring, if, unfortunately, you have any.

Considering that the object of matrimony is the begetting of children, it would be a good thing for the state to legally recognize that it is as much a sin for an invalid in advanced consumption to marry, as it is for a leper or insane person. As for two tubercular or scrofulous persons marrying each other, it ought to be prevented by law if possible; otherwise it ought to be understood that such tainted unions are not for the purpose of progeny.

Since the law is not allowed to interfere and help solve this problem, the only recourse is *education*. With us in America, this is the saving grace from the universal law of degeneracy. The lower strata are constantly made capable and worthy to take the places made vacant by degeneracy in the upper. The common brotherhood of man, as exemplified in free schools and universal education, is helping to supply the sinew and vitality from the middle and rear ranks, which the front rank sadly needs.

Therefore the fostering and perfection of our common, grade and academic schools are duties that should be dear to the heart of every true American. To give character, mental force, and healthy bodies, fit for the propagation of a truly noble race, a change in our systems of education is needed. The introduction of physical training and the regular superintendence of the physical conditions and habits of scholars, in all grades of schools, should be features in all systems.

The introduction of science teaching early in the course, and the later substitution of proper text-books and teachings of physiology and anatomy, are likewise essential features; and then, either in seminaries or colleges, the maturer mind of the scholar, both male and female, needs to have direction given to all this previous acquirement by books purposely written for them. The object of such literature is to have each scholar train herself or himself to present in her or his person a "*Mens sana in corpora sano*" embellished by all the beauty, loveliness and grace for women, and capability, strength and vigor for men, possible. Finally, the object should be to fit each one to choose wisely her or his mate in life, and to understand the whys and wherefores of this choice. Here is a work for the state, or perhaps for a national body like this association to do, namely, the selection of a proper committee to act as censors of such literature which in turn perhaps might be elicited by proffered rewards commensurate with the skill and knowledge required. The formulation of such a plan, by which this matter can be properly presented to young people before marriage, is an object worthy of this association or any other similar body of men.

Through their state boards of health, the states can do, and are doing, good work in guarding the public health and aiding in the prevention of disease. But, in order that the work there may be united and made more effective, all laws and systems pertaining to the preservation of health ought to be centralized.

Heredity and marriage, so intimately associated with the statistics of disease; infection and contagion ; prevention of endemics, epidemics, and food adulteration · quarantine and inland sanitation; the knowledge of climates and seasons ; the protection and preservation of life on common carriers, both on land and sea ; all are parts of one whole, which ought to be recognized as an independent department of our great government.

The guarding and regulating the health of the people is a national duty, co-equal with the purposes of any of the departments which have gradually been added to constitute, through their representatives, the president's cabinet.

The intelligence of the people and their belief in the importance of the subject of public health, find now timely expression in the popular demand, made by the united medical profession, that a national board of health be established, thus recognized and constituted with its head a cabinet member.

It is hoped that such a representation of the health needs of our people will be one of the crowning features of our government at Washington.

ALCOHOLIC INEBRIETY.

BY C. SPENCER KINNEY, M.D.,
Assistant Physician New York Insane Asylum, Middletown, N. Y.

To those who delight in the employment of statistics to emphasize the importance of the points under consideration and prove the truth of their deductions, the study of alcoholic inebriety is not very satisfactory.

The statistics are too confusing. They are modified by ignorance and indifference ; they are distorted by prejudice and cunning, and suppressed by the pride and conceit of those whose duty it is to give information on the reception of the patient for medical treatment.

It appears about impossible to view the alcoholic inebriate from anything but a sentimental standpoint. Some reformer whose philanthropic eyes have never seen the sun except when at the zenith, starts the story that eighty per cent. of crime and insanity has its origin in the use of distilled liquor, and every printing-press in the country is at once engaged to educate the masses on this interesting point.

That intemperance in the use of alcoholic liquors entails misery to the living and the unborn, no one can deny. As no two human beings are constructed on precisely the same lines, we cannot expect that they will endure the same strain with equal degrees of resistance. When a man is suddenly subjected to any great physical or mental depression he must thank his heredity for the consequent result ; whether he acts on the impulse of the moment and blows out his brains, or drowns his grief in the fabled oblivion found from drink, or whether he bends and not breaks, and quietly resumes his proper relationship in life

An inherited predisposition that is shown by a peculiar neurotic temperament, coupled with unfortunate early companionship, leads many into the well-known path trod by the alcoholic inebriate.

Emotional overstrains, like worry and grief, may lead some to inebriety ; while physical disease, or injury to the head, may induce others to fall.

That eminent English authority on inebriety, Dr. Norman Kerr, claims that eighty-seven per cent. of his cases have been of a nervous temperament. I think that this is not far from the proportion that we find in the United States.

Regarding the nativity of cases of alcoholic inebriety, we find that they are usually in the following order of frequency:

(1) United States.
(2) Ireland.
(3) England.
(4) Germany.

The proportion varies, of course, according to the nationality of the district supplying the patients.

The ingenuity of many writers has developed singular facts from the causes leading to alcoholic inebriety. Perhaps some of these simply illustrate the meeting of the extremes in nearly all conditions of life.

Alcoholic inebriety claims most of its wrecks from the believers in the Christian religion, Protestant as well as Romanist, educated as well as unlearned. The Jewish race in England as well as in the United States, is singularly exempt from the vices of drink, while the followers of Buddha and Mohammed put us to shame by their immunity from this induced disease.

Dr. Kerr, in speaking of this condition, says: "As a whole, Anglo-Saxons seem to be more prone to this disease than any other race; but the Russians, the Swedes, the Belgians, the Germans, the Swiss, the French, and the Austrians seem to be steadily coming up to the English and Americans. In this statement I am not referring to acts of drunkenness, but to the overpowering impulse to intoxication, the disease of inebriety or narcomania. It is interesting to note that as Jews carry their sobriety into every country (some parts of Russia excepted), so do the Anglo-Saxons carry their insobriety all over the world. We British are the finest colonist extant, but to our shame be it recorded, our triumphant march over the inhabitable globe has been marked by a disgraceful and damning trail of alcoholic drunkenness, destruction and death. Our demoralization and decimation of native races by the drinking habits which we have taught them, are a hideous blot on the escutcheon of our fame, a reproach to us as a people, a dishonor to us as a civilized nation." (Page 132.)

Alcoholic inebriety is a constitutional disease of the higher nervous system, caused by continued indulgence in alcoholic liquors.

At different vantage-grounds of observation, an alcoholic inebriate presents a view of diverse proportions. To the moralist, a self-constituted and self-perpetuating sinner stands out silhouetted against the light of his "might have beens." According to the moralist, all that is required is a change of habit—a dropping of old associations and methods of living; not alone a change of heart, but a complete revolution of the individual's mental and moral life. In theory these views are good, and cover the case with nebulous possibilities. To be sure, these views are entertained to a greater or less degree by all who have considered this subject. They represent themselves boldly when we state causes, and they insist on recognition in the management and treatment of the disease.

To the judicial mind the alcoholic inebriate represents vice. He is a self-seeking despoiler of his own prospects, and of his family's happinesss, and stands in need of the law's disciplinary, "Ten dollars, or ten days."

To the physician, who watches the changes taking place in the one who is gradually yielding to habitual inebriety, there is but one conclusion to be satisfactorily reached when viewed in the light of cause and effect, and that is—that it is a disease. As proof, he may state his post-mortem findings in the congested stomach, the nutmeg liver, the degenerated kidneys, the fatty, flabby and weak heart and atrophied brain, shrunken membranes, hypertrophied neuroglia, atheromatous and tortuous vessels, with shrunken and distorted brain-cells, as shown by microscopic examination.

The action of alcohol on nervous tissue is able and does produce a great degenerative change in the physical and moral strength of the drinker, and results in as much of a disease as is found in terminal dementia or chronic dyspepsia.

If the physician should be in doubt whether the disease has progressed far enough to be called insanity, let him stand the inebriate up alongside of this definition of insanity, and see if it fits: "Insanity is the prolonged departure from the state of feeling and methods of thinking usual to the individual when in health, as a result of disease of the brain." Through the possession of a neurotic taint there are some predisposed to the drink habit, with whom bad company and bad advice are in the train of first steps, and an occasional indulgence degenerates into a habit. It does not stop there, but goes beyond that stage, and, taking deeper pathological hold, becomes a disease over which the patient has only a limited control, owing to the toxical enfeeblement of his mental faculties.

The full and free public consideration which this subject has had through the newspaper and magazine press during the past five years has been productive of benefit in educating the masses to a more intelligent comprehension of this disease.

What the alcoholic inebriate needs is proper medical treatment, and until he has had this we cannot feel at all sure what practical use to himself or society it is possible to make of him. When a man's system becomes saturated with liquor from continued drinking, he is in a peculiar physical and mental condition. Physically, he offers to labor and to disease less than his healthy degree of resistance; for he tires with the one and succumbs easily to the other. Mentally, his condition is not only peculiar, but lamentable. From the capable, attentive, pleasant, generous, yet positive man of business, endowed with clear ideas of his social obligations, you see, traduced by drink, through various degrees of transformation, the incapable, inattentive, irritable, yet vascillating spendthrift, whose ideas are indefinite, and who often becomes possessed of no more originality than an echo. His moral sense becomes obtuse, the corners knocked off to such a degree that his conscience is seldom pricked, and there is scarcely a day in which he does not attribute blame to others for a condition in which he has industriously labored to place himself. This state leads to thoughts of suspicion of those about him and depression of spirit, until judgment is seriously impaired. All these symptoms and more exist, not when the individual is drunk, but when he is free from the immediate effect of drink. There is a change in his normal mental condition, and while he may not be considered insane by those who seek for delusions, yet his mental strength is enfeebled and he may be properly called an alcoholic dement. There remains in him no apparent mental elasticity. This condition is as others see him, not as he views it; and to others who know what his symptoms denote, they point to disease. He is willing to admit that his habit is an unfortunate one, but claims he need go no further; and if he is recovering from a more than usually free indulgence, may promise to stop, may give his word as a man that he will drink no more, and may sign a pledge with such forms of solemnity as seem most fitting to himself or friends; but the instances are few when these vows are not traced in sand, and the first returning tide of desire finds the resolve effaced. His reason for relapsing would seem nonsensical, were we to consider his situation a result of habit, and not that of an enfeebling mental disease. Two illustrations will suffice: After several days of drunkenness, a gentleman who was a man of long business experience and superior education, was pressed for a reason for breaking a long-continued period of sobriety, at last reluctantly admitted that it was owing to having received a letter from his mother, whom he dearly loved. Another of the same grade of intelligence said it was owing to a desire to see his mother. He began drinking when he first felt this desire, and traveled to the city where his mother lived, avoided the house, and finished drinking in Boston—over two hundred miles away from home. Neither perceived the foolishness of his excuse, but clung to it as if it were wholly sufficient for his conduct. Coupled with this obtuseness of judgment is a conceit of their mental and moral strength, to which they look for future freedom from the relapses that have been in the past steadily working to wreck their lives. This tendency is shown after a few days of treatment, when the patient imagines he has the whisky out of him, recalls the possibilities of the past, with the degrading necessity for present treatment, and looks forward to the future and its kaleidoscopic possibilities, with no apparent thought that his downfalls are ever to be repeated, and that his pathognomonic story has been told by travelers on his route from all time.

It is with pleasure that I quote Dr. Isaac Ray regarding the state of mind held by the patient: "The restoration of the bodily condition to something like its customary strength and firmness, with all the pleasing sensations which follow such a change, excite no distrust of their power to resist temptation. On the contrary, they are always hopeful, confident, sanguine, and impatient of delay. They say they feel perfectly well, have not the slightest desire for drink, and therefore their further seclusion would be not only unnecessary, but prejudicial to their mental and bodily health. The amazing confidence such persons invariably express in their future security is one of the curious traits of this condition. A great many have come under my observation, but I have never known one, not even of those who had repeatedly fallen and had most deplored their infirmity, to express any apprehension of falling again. On the contrary, from the moment when they begin to resume their proper consciousness until they leave the hospital, the burden of their story is that they are safe forever after; that not the slightest danger exists of their again disregarding the terrible lesson of experience. Instead of returning into the world with fear and trembling, as one would naturally expect to see them, and seizing upon an excuse for postponing the day of trial, they go out eager and jubilant, as if bound on a festive excursion.

"Thus beguiled by a morbid confidence in themselves, they determine to resume their liberty in spite of entreaty and argument, and the institution has no power to prevent it. Neither the hospital for the insane nor any asylum for inebriates can hold persons in confinement against their consent, for any other cause than insanity; and though our account of this class of persons does not indicate in them a very healthy condition of mind, yet inasmuch as they are apparently rational after the first day or two, both in conduct and conversation, they cannot be called insane in the ordinary acceptation of the term. While in the paroxysm, or suffering under its immediate effects, they may very properly be called insane, and so long they may, unquestionably, be deprived of their liberty for the purposes of custody or cure. But when this condition shall have passed away, forcible detention in any institution, whatever it may be called, would be clearly a violation of constitutional rights, and would not be sanctioned by the legal tribunals.

"A notion prevails, I am sure, that the inebriate asylum is to be provided with bolts, bars, and guards, and no means of detention allowed more forcible than the offices of kindness, good will, and love. Respecting this notion it need only be said that it indicates but a schoolboy's knowledge of human nature, and a still deeper ignorance of that special phase of it which results from long-continued irresistible inebriety."

The inebriate has no reason to complain that efforts have not been made from time to time to bring about a reform in his style of living. Probably no treatment for drunkenness has ever been recommended that has not been of some benefit to some one. He has been prayed with and sworn at; he has been treated with loving tenderness, and he has been abused; he has been thrown on the support of his word as a man, and he has bowed his head to the decrees from the bench; he has taken long voyages on water and land, and he has been kept at home; he has been kept from liquors by trusty nurses and relatives, and he has been fed with liquor in every manner that a cunning ingenuity could suggest. What to do with him has puzzled many. When we consider that he is suffering from a disease, we are on the threshold of learning what can be done for him. About everything that enters into and is a part of him in life and associations becomes a matter of interest when treatment is contemplated.

His ancestry, early training, habits, moral and physical caliber, must be considered in order to determine what kind of material you have on which to begin.

A man who possesses a weak will, but little moral sense of responsibility, and a love of low associates can be sobered up; but the length of time he will remain sober depends upon time, place, and circumstances. The chances are that no treatment known will be of permanent benefit to this class of patients. From sobriety to drunkenness they relapse with disheartening regularity, becoming more enfeebled mentally and physically, until they finally represent the driftwood of a community. If the individual has become demented through the effects of long-continued liquor drinking it is useless to expect that his mental integrity will be wholly restored, only that portion of the brain that is uninjured by alcohol is going to act in a fairly healthy condition after the most satisfactory of treatments.

Every community has a number of men and some women who are rapidly becoming nothing more or less than shiftless, habitual drunkards. They are useless to themselves and to everybody else, and it is simply a question of time before they become public charges. If they do not become so themselves, their children stand a good chance of being wards of the State in one capacity or another, and this should not be forgotten.

These points are too often overlooked when patients are completing a course of drug treatment for inebriety. Some expect a complete change to occur in the character of the individual—a change making it impossible ever to drink liquor again. Now this is nonsense, born of ignorance of the subject. No treatment is going to benefit permanently one who has no wish to stop drinking, and who prefers to associate with those who do drink. An exasperating condition of affairs awaits the physician who treats these patients. He cannot judge, to begin with, just what the outcome of the treatment may be. The case that appears favorable in the beginning may relapse quickly, while the one surrounded by doubt may make a good recovery and return to usefulness after years of spasmodic effort to keep sober have made his friends weary and disgusted. This simply illustrates that the effects of liquor may conceal more will-power, self-control, and judgment that we may be aware of. In favorable cases you may expect one of three results—an improvement, a reformation, or, in a number of instances, nothing more or less than a regeneration.

I believe that it is safe to say that about ten per cent. of the patients who are now under treatment in our State hospitals have become insane by the use of distilled liquor. Many of these will go out recovered, and some will never relapse. The majority is likely to break down if circumstances are moderately favorable. Uncomplicated cases of alcoholic inebriety that have reached the stage of insanity will not number in this population of our hospitals more than two (2) per cent. of this number.

The importance of intelligent medical treatment cannot be too strongly urged, and the less they associate with their kind during this time of treatment, the better is their chance of recovery. Otherwise they while away their time during treatment by recounting to each other their past experiences, with a certain amount of fool pride that is little calculated to establish a sound moral tone, or to allow them to use what self-control has not been destroyed by reckless indulgence.

The instability and unreasonableness of the recovering inebriate is similar to that of most of the insane at the same stage. In the inebriate it means, however, a returning craving for drink. When the period is reached in which the immediate effects of liquor have passed away and the mind has cleared up, the necessity of at once attending to business becomes the one serious wish of his life. It is at this point in his treatment that the foundation is frequently laid for relapse from the liberty allowed him by his medical treatment. In some instances the doctor is led to believe that ruin of the mind, person, and estate, with a *habeas corpus* attached, is going to be the result of prolonged custody.

A number of years ago Dr. Portugaloff, a celebrated Russian physician, used with marked success a solution of one grain of strychnine to 200 of water, injecting five drops every twenty-four hours. So confident was he of the good results likely to follow that he recommended the establishment of dispensaries under public control, for the purpose of giving his treatment to those who needed it. This is believed to be a practical and good idea by those who have given the subject of drug treatment a thorough trial.

The single remedies that have been used with success for the treatment of inebriety are: Nux, belladonna, cinchona, capsicum, macrotin, stramonium, and veratrum viride, generally in low potencies. It has not been my fortune to see the results that have been said to follow the use of high potencies for the treatment of inebriety, recommended by the celebrated Dr. Gallavardin.

In addition to medicine regularly administered, hot milk at frequent intervals, say every two or three hours, as the condition of the patient demands, should be given, care being taken not to overload the stomach, yet giving it something to do. Hot milk is not only one of the best of foods, but it is a tonic in its effects.

It is well to tell the patient the need of time and care, and the importance of treatment. Tell him it will not perform miracles. No one should be permitted to take treatment who does not honestly wish to be relieved of the drink thraldom. The taking of medicine will not render it impossible for a person ever to take liquor; nor will it restrain him from associating with those who habitually use liquor. It will not change the natural disposition of any individual, and it will be useless to expect such a change. Should a man be demented by much drinking, there will be nothing certain about the results of treatment. The chances are against any help for him. Prolonged treatment will, however, generally do these things:

It will remove the desire for liquor, rendering it unnecessary for the patient to drink again. It will also improve the patient's general physical condition, and enable him to entertain for himself some degree of self-respect.

It will bring out the better qualities of the patient that have been lying dormant under the influence of this drink habit. This fact must be seen to be understood. Should the patient attempt to recultivate the habit of drinking, there is no earthly reason why he should not do it. Liquor will have the same effect upon him that it has always had. Recollect that treatment will enable a man to remain sober if he so desires, and resolutely cultivates his regained self-control.

To talk of alcohol as the sole specific cause of inebriety is a mistake, that reflects on the powers of observation of a medical man. In almost any circle of life facts to the contrary can be found. Inebriety is a disease of degeneration involving and depending on many and most complex causes, and not alone on one drug like alcohol.—*Quarterly Journal of Inebriety.*

◆

POTATO POISONING.

In the July number of the *Centralblatt fur die gesammate Therapie* there is a condensed account from the *Archiv fur experimentelle Pathologie und Pharmacologie* and the *Correspondenz-Blatt fur schweizer Aerzte*, of an investigation into the proportion of solanine contained in potatoes under various circumstances. The inquiry was undertaken apropos of certain cases of poisoning among French and German soldiers attributed to potatoes. It seems that in 1892 three hundred and fifty-seven men of the garrison in Alsace were seized, one after another, with frontal headache, severe coliky pains in the stomach and bowels, vomiting, diarrhœa, prostration and moderate stupor. In a few cases there were pallor of the face, blueness of the lips, great dilatation of the pupils, brief faintness, and acceleration of the pulse followed by its retardation. In the severer cases there was a rise of the temperature to from 101° to 103° F. In only one case was there collapse, and in that it was of brief duration. In the course of ten days all the men were well. Not long afterward ninety men of another garrison belonging to the same army corps were attacked with similar symptoms, and in 1893 one hundred and eighty-six men belonging to a battalion of infantry and to one company of another battalion were taken with vomiting and diarrhœa, together with great weakness, abdominal cramps, and pains in the back and limbs, but without dilatation of the pupils. Although the cases at first seemed severe, they all ended in speedy recovery. A few years before, the same symptoms had occurred in a division of the Lyons garrison and been attributed to eating bad potatoes. While it was chiefly new, unripe potatoes that were eaten in Alsace, the French soldiers ate old ones that were sprouting.

From the chemical investigation made to clear up these cases it appears that potatoes that are fresh and have not sprouted contain, from November to February, from 0.04 to 0.046 per cent. of solanine, and, when peeled, only from 0.02 to 0.025 per cent. Old potatoes that have sprouted, in the period from March to July, may contain from 0.08 to 0.116 per cent. of solanine. When potatoes have been made to sprout artificially and the sprouts were about a tenth of an inch long the chemist found 0.212 per cent. of solanine. The alkaloid is especially plentiful in the sprouts themselves; in a sprout a third of an inch long he found about 5 per cent. of it, but it decreases with the growth of the sprout, so that in one a little over three inches long he found only 2.7 per cent. Especially significant were the examinations of spoiled potatoes. Those that were withered and softened were found to contain 0.144 per cent. of alkaloid. In a piece a year old, black internally and beset with fungi, 1.34 per cent. of solanine was found. Sound potatoes containing 0.043 per cent. of solanine were inoculated with the fungous growths, and at the end of two months, although but few of the inoculations had proved effective, they were found to contain 0.08 per cent. of the alkaloid. The dwarf potatoes produced by sprouting in the cellar were found particularly rich in solanine, containing as much as 0.52 per cent. The conclusion was reached that potatoes must contain an exceptional proportion of solanine to be poisonous, and be old, withered, or sprouting.—*New York Medical Journal.*

Department of Physiological Chemistry.

WITH SPECIAL REFERENCE TO DIETETICS AND NUTRITION IN GENERAL

QUANTITY OF FOOD.

To THE question which has been frequently asked, What quantity of food is best adapted to the preservation of health? no satisfactory answer can be given, without a reference to the habits, occupation, and age of each individual; the degree of health he enjoys, as well as the season of the year and other circumstances. As a general rule, it will be found, that those who exercise in the open air, or follow laborious occupation, will demand a larger amount of food than the indolent, or the sedentary. Young persons, also, require more than those in advanced years; and the inhabitants of cold, more than those of warm climates. We say this is a general rule; for very many exceptions are to be found in each of the particulars. Thus, we not infrequently find that more than one individual requires more food to support his system than another of the same frame of body and trade, and who partakes of the same degree of exercise. In fact, one person will support his strength, or even become more robust upon the same quantity of food, which will occasion in another debility and emaciation.

If we refer to the brute creation, which are guided in this respect by an instinct which but rarely errs, we find that one horse requires more food than another of similar age and size, and with the same degree of exercise; and if his accustomed quantity be diminished, he will become thin and spiritless. This is true, also, in respect to other animals.

Every person arrived at the age of maturity, or even before, should be able to judge for himself, as to the quantity of food proper for each meal, as well as to the frequency with which it should be repeated during the day. Few appear, however, to be aware of the important fact, that the body is nourished, not in proportion to the amount, or even the nutritious qualities of the food which is consumed, but to the quality which the stomach actually digests. All beyond this disorders the stomach; and if the excess be frequently indulged in, the latter becomes finally incapable of converting into nutriment even a sufficiency for a support of the system. Most persons act as though the strength, vigour, and health of the body rise in proportion to the load of food they are capable of forcing daily in the stomach; and hence, over-feeding is the common error, at least in our own country. A slight deficiency of food is, however, far less injurious than too great an amount. The old maxim "If health is your object, rise from the table before your appetite is sated," is founded in truth; and though the Epicure will sneer at it, yet were he wisely to adhere to it, he would save himself from many a gloomy hour of pain and suffering.

When the stomach is not labouring under disease, and the individual is otherwise in health, the natural appetite is one of the very best guides—the only one indeed,as to the time for eating, as well as to the quantity of food. Whenever such appetite exists, wholesome food may, and ought to be taken; we should cease from eating the moment it is satisfied.

The eccentric authors of Emillius makes the following very judicious remarks in reference to the diet of children:

"Whatever regimen you prescribe for children, provided you only accustom them to plain and simple food, you may let them eat, run, and play as much as they please, and you may be sure they will never eat too much, or be troubled with indigestion. But if you starve them half the day, and if they find means to escape your observation, they will make themselves amends, and eat till they are sick.

"Our appetite is only unreasonable, because we choose to regulate it by other laws than those of nature. Always laying down arbitrary rules, governing, prescribing, adding, retrenching, we never do anything without the scales in our hands; and this balance is formed according to the measure of our fancies and not according to that of our stomachs."

The foregoing remark will equally apply to the adult as well as to the child. It is important, however, that "the balance" of the stomach be not rendered untrue by the acts of cookery—in other words, that an artificial appetite be not created by a variety of luxurious dishes—by sauces, condiments and wine.

It is surprising how often the stomach, within a very short space of time, may be artificially excited to a renewed desire for food. The man, however, who eats under such circumstances, must not be surprised at his uncomfortable feelings and frequent ailments. He has scarcely more right to expect health and long life, than the individual who would attempt to nourish himself with poison.

THE BATTLE OF THE CELLS.

By Dr. Andrew Wilson.

In the year 1846 Dr. Augustus Waller, of London, published a very remarkable paper descriptive of a hitherto unknown power possessed by the white corpuscles of the blood. Watching the flow of the circulation in such transparent tissues as are presented by certain parts of the frog, Dr. Waller beheld what he called the migration of the white corpuscles through the walls of the fine blood-vessels. These migrating cells appeared to pass out from their native channels, and to make their way freely among the tissues of the animal's body. They behaved themselves as if they were independent organisms, endowed with a vitality separate and distinct from that of the animal of whose blood they formed an essential constituent. This emigrating process—or *diapedesis*, as it was called—naturally attracted much attention. So extraordinary were the phenomena described by Dr. Waller, and so strange was the idea that the white blood globules could thus wander at their own sweet will through the animal organism, that it was not wonderful to find the correctness of view of the physiologist-discoverer questioned by some and denied by others.

But the discovery did not remain very long as a doubtful contribution to science. Wharton Jones had described the peculiar movements of these white corpuscles, and Cohnheim, twenty years later, gave an account of the migration process. Many important discoveries in science take their origin from an observation the full meaning of which is not known or appreciated at the time of its first announcement. It was so, I think, in the case of the white blood corpuscles and their errant propensities. The first chapter of the scientific story, written in 1846, has been followed only of late years by a tolerably full development of the plot and incidents of the tale. Today we are witnessing some of the wonderful and interesting results which have flowed from the researches of Dr. Waller and others half a century ago. It is the general history of these later researches which I propose to narrate in this paper.

A brief study of the microscopic character of the blood will serve as a suitable preface to our narrative. Under a fairly high power of the microscope, blood is seen to present itself as a fluid clear as water (the *lymph* or *serum* of physiologists), and to derive its color from the presence of an enormous number of microscopic bodies which float in the liquid. These bodies are the red corpuscles. Seen *en masse*, they give to blood its well-known hue. Under the microscope, and spread out in a thin layer, their color is seen to be of a yellowish tint. As regards size, the red corpuscles measure, on an average, about one-three-thousandth of an inch in diameter. Each is a biconcave disk, so that when we look at a corpuscle sideways it presents something of a dumbbell shape. This description applies to the blood of a man and of other mammals at large, except the camel-tribe, which, curiously enough, have red corpuscles not circular in shape, as in other quadrupeds, but oval in contour. Fishes, frogs, reptiles, and birds possess red corpuscles of oval or elliptical shape, and each possesses a nucleus or central particle which is wanted in mammals.

In addition to the red blood corpuscles, we find in the blood certain very small colorless ones, called "blood platelets." Of these we need take no further notice here; but, existing in the proportion of about two or three to every thousand red ones, we find the white corpuscles of the blood, with the mention of which bodies this article was commenced. These white corpuscles are colorless, and thus stand out in contrast to their red neighbors, which are colored with a substance called *hæmoglobin*, whereof iron is prominently consistent. But more important is it to note that in its constitution each white corpuscle is a very different body from its red neighbor. It is really a microscopic mass of living protoplasm. It has a nucleus in its interior, and in every respect we may regard it as a living cell. Moreover, it behaves itself as an independent cell, just as the researches of early days informed us. Watched on a specially prepared microscopic slide, we see the white corpuscle flow from one shape to another. In this respect it moves by alterations of its protoplasmic substance, just as does the animalcule we know as the *amœba*, a denizen of stagnant waters everywhere. This likeness of motion to that of the animalcule of the pool has procured for the changes of the white corpuscles the term "amœboid" movements.

Wonderful as it is to think that our blood teems with myriads of these independent living blood cells, it is yet more extraordinary to find that they resemble the animalcule in another respect. The amœba eats by engulfing its food particles with its soft protoplasm body. In like manner will a white blood corpuscle feed itself. It will engulf and ingest solid particles which fall in its way, and will reject indigestible matters. That work which we see the white corpuscle doing on the microscopic slide it effects within the animal tissues. We know now, as Dr. Waller knew in 1846, that, in virtue of its independent life, it can push its way through the soft, delicate walls of capillary blood-vessels and pass into the tissues. In place of regarding these locomotive powers as ways and works of unusual character, we now see that they form part and parcel of the complex living mechanism. While it is the duty of the red corpuscles to carry the oxygen breathed into the blood to all parts of the body, and conversely to convey the waste carbonic-acid gas to the lungs, there to be exhaled, the function of the white corpuscles is of far more complicated character. They perform a duty which not only lies very close to the maintenance of the organism at large in a natural sense, but which also bears an important relation to its preservation from agencies that perpetually threaten it with disease and death.

In the fresh waters of the world certain small forms of crustaceans are extremely common. The eye may detect these creatures flitting about as mere specks in a tumberful of water drawn in summer from any brook or pond. These organisms are known, popularly and generally, as "water fleas," and amongst them one form, the *Daphnia*, or "branch-horned water-flea," is familiar to every microscopist. Its body is clear and transparent, so that the vital processes can be watched in this little creature with little trouble on the part of the observer. Now Metchnikoff, who is chief of the service at the Pasteur Institute of Paris, and a well-known biologist, observed that in the Daphnia a curious series of phenomena was occasionally to be noted. In Paris a low form of vegetation allied to the yeast plant is found in certain waters. It flourishes, for instance, in the water of the reptile-tank, in the Jardin des Plantes. Here is found, also, the *Daphnia magna*. At certain times, the little crustaceans are noted to present a milk-white color, which, on examination, is found to be due to the presence in their bodies of the *spores* or youthful forms of the vegetable organism. To this organism the name *monospora* has been given. What is seen in the water-flea is really a case of plant attack on the animal form. The spores bud and grow in the interior of the animal, and, overwhelming it, block up its tissues, and in due season kill it.

When a Daphnia has swallowed some of hese monospora-spores, they pass into its digestive tube. But when the spores attempt to pass through the tube and to gain admittance to the body cavity of the crustacean, its white blood cells are seen to attack them. One cell may be joined by others, so that the spore in this latter case is actually enclosed and encircled by a multitude of these living corpuscles, which fuse together and form a mass of protoplasm, known as a *giant cell* or *plasmodium*. Within this living environment, single or collective, the spore is actually destroyed. It is eaten by the white corpuscles of the Daphnia's blood ; that animal possessing only white corpuscles, and its vital fluid being of colorless nature in consequence. That this is a real destructive action on the part of the white cells of the crustacean is proved by a very interesting observation. Metchnikoff tells us that if a spore has penetrated through from the digestive system half-way only, so that half of it is still in the intestine and half outside that tube, the half outside which is attacked by the white blood cells is destroyed, while the inside half, not subjected to such destructive influence, remains unaffected. As a rule, the Daphnia falls a victim to the attack of the monosporas, notwithstanding the gallant defence against infection which its white blood cells make. But if the animal can gain the slightest advantage in this warfare, the tables are turned on the vegetable invaders. If, for instance, an infected Daphnia is removed to pure water and freed from further infection, it often happens that it will completely recover. Its white blood cells free it from the vegetable pests, and restore it to its normal condition.

It is curious to note that other fungi which develop and flourish on the surface of the Daphnia's body are more fatal to its welfare than those which, like the monospora, grow in its interior. Thus there is a fungus allied to that which produces the salmon disease, *saprolegnia* by name, that represents a surface-growth sending root-like filaments into the Daphnia's body. These roots appear to be much more difficult objects to dispose of than the spores which freely circulate in the blood, where the white cells can meet them on their own terms. Hence the cells are thus placed at a disadvantage. The conditions of battle are unequal between a flourishing external fungus and the cells of the blood ; and so the Daphnia succumbs much more readily under the saprolegnia attack than under the attentions of the monospora and its prolific brood.

From the Daphnia, Metchnikoff and other observers, stimulated by the fruits of his work, turned their attention to animals of a higher rank in the scale of being. The frog, most useful of animals to the physiologist, was selected for experimentation with disease growths of well-known type. The amphibian is a cold-blooded animal, as everybody knows; its vital processes are of slower nature than those of warm-blooded organisms, and its structure at large enables the processes equally of health and disease to be conveniently studied. Science, from the days of Galvani onwards, owes a deep debt of gratitude to the humble frog.

The microbes or bacilli selected for experiment on the frog were those of *anthrax*, or "splenic fever." This disease, very fatal to cattle and sheep before Pasteur's system of inoculation came into vogue, is called in man "wool-sorter's disease." Formerly, and before steps were taken to disinfect wool, it was not an uncommon ailment among wool-sorters, and a very serious and most fatal ailment it is in the human being, as in the unprotected quadruped. The rodlike germs or bacilli which are the cause of anthrax are well known to microscopists; their development has been fully studied, and they can be artificially cultivated in various ways. Now, fatal as these bacilli are to many higher animals, on the frog's constitution they have but little effect. In place of dying from splenic fever, or its analogue in amphibian life, the cold-blooded frog simply suffers from an ordinary inflammation, which appears to have nothing specific about it. If the frog is inoculated with anthrax bacilli, the animal, as I have said, exhibits symptoms of local inflammation; but when, after a period, the blood of the animal is examined, white blood corpuscles containing bacilli in their interior are duly discovered.

The analogy between the water-flea combating its vegetable intruders, and the frog fighting the bacilli with its blood-cells, was too close to escape notice. Further researches made plain the fact that the warfare seen in the former animal was equally well represented in the latter. Transferred to the microscopic slide, the white blood cells of the frog were seen to surround the bacilli, just as the amœba of the pool engulfs its food. Examined at a later stage of affairs, the bacilli may be seen to be undergoing degeneration, and to be breaking down in the interior of the white cells. More extraordinary still is the observation that if a bacillus is too long for a white corpuscle easily to engulf it, the microbe will actually be bent round so as to be accommodated to the size of its devourer. Nor is this all. When bacilli which had been partially acted upon by the white cells were injected into rabbits—animals eminently susceptible to the attack of anthrax—the rabbits remained free from the disease. The clear inference to be drawn from this observation is that the bacilli, which before their capture by the white cells are powerful for evil, are killed by the cells, or at least deprived of the properties to which they owe their disease-producing powers.

I have said that the frog itself is not susceptible to anthrax, and cannot be inoculated with the bacilli of that ailment so as to be made to suffer from the disease. This is the normal state of matters with the amphibian. Possibly as a cold-blooded animal it refuses, in virtue of its own constitution, to succumb to the ailment which is so disastrous to certain warm-blooded forms. In its natural state, therefore, the frog defies the bacilli, presumably because its white cells are able and adequate to protect it from attack. But suppose the conditions of frog life to undergo an alteration which brings it somewhat within the lines of the warm-blooded animal's life, or at least perverts its constitutional powers to a certain extent, then a highly instructive difference is to be noted in its relations to anthrax infection. If the temperature of the frog be heightened by keeping it in a chamber heated to 100° Fahrenheit, and if it be then inoculated with anthrax bacilli, it will die. Thus we see that the white cells have become demoralized by the altered environment of their possessor. They no longer present a bold front to the enemy. Few of them have engulfed bacilli, and the germs run riot through the tissues. The heat, which does not suit the frog, is favorable to the bacilli; and so the weakening of the amphibian's line of defence by the deterioration of its white blood corpuscles leaves it at the mercy of the microbes.

Hitherto I have spoken of the white blood corpuscles under their own and ordinary name. But as science has penetrated deeper into their history a new terminology has sprung up by way of indicating the powers they possess in the way of protecting the animal body against the attack of inimical particles. Thus it is a common practice to speak of all white blood cells as *leucocytes*, while, having regard to their power of devouring foreign bodies, they have been called by Metchnikoff, *phagocytes*. The theory of *phagocytosis* is therefore noted to be that view of the living organism which maintains the power of its leucocytes or white blood corpuscles, to eat and devour alien matters that threaten the welfare of the body to which these wondrous living cells belong.

Let us now endeavor to trace the history of these leucocytes backwards, and to note, if possible, the circumstances of their origin and development. Whence do they originally spring in the history of the body's evolution? And how have they come to acquire the habit of defending the organism against the foreign invader? To both of these questions, I think, science can offer a fairly satisfactory reply.

First of all, as regards the individual body of the higher animal, I think we may safely say that the spleen, the lymphatic glands, and allied structures supply the white corpuscles of the blood. These structures are called "blood glands," because they are specially concerned with the renewal of the blood elements. That the spleen manufactures leucocytes, as we may now call the white corpuscles, admits of no doubt. The researches of the Edinburgh School of Medicine particularly, and the names of Hughes, Bennett and Sanders, will at once appeal to physiologists in respect of the discovery of the duties of the spleen. We know that the spleen is perpetually turning out white corpuscles, and red ones as well, as part and parcel of its natural function; and we know also that in the disease known as *leucocythæmia* (literally "white-celled blood"), in which the white corpuscles are vastly increased in number, the spleen is specially affected. This last condition of white-cell increase represents, in one phase at least, the increased and abnormal work of that organ. Besides, microscopic examination of the normal spleen pulp shows us blood corpuscles in all stages of breakdown and in all stages of formation. I have always likened the spleen to a railway depot where new rolling stock is not only being perpetually manufactured, but partially used stock is also being repaired and old stock got rid of. If the blood is placed in the position of the railway, we may be able to realize the justice of the mataphor.

It is not alone in the circulating blood, however, that we find our leucocytes; and this observation is a point of some importance, in view of our future researches into the origin of these wandering cells of ours. Lining the blood-vessels is a delicate membrane which is spoken of in science as *endothelium*. There appears to be little doubt that the essential feature of this membrane is its cells, which possess powers and properties analogous to those we have seen to be the inheritance of leucocytes themselves. Metchnikoff maintains—and I do not know that his opinions have been scientifically questioned in this respect—that many of these cells of the blood-vessels, fixed as they are, can protrude their living substance, and thus capture and destroy, or at least engulf, foreign particles. Very natural it is, I think, that the blood-vessels themselves should be the seat of an action which has so much in common with the powers possessed by the wandering leucocytes. We might, indeed, compare this defending combination of cells to an army, one portion of which remains to protect home interests, while the other portion has a roving commission as free lances, or as a flying column, to make war or to defend whenever opportunity occurs.

The original source of leucocytes, or, rather, the relation they bear in the great scheme of evolution to life at large, is a topic of interest, because we have been enabled to trace with a clear hand the development of these white blood cells in higher organisms from the cells of lower life.

Here, as elsewhere, in higher organisms we can trace the abiding influence of lower forms. Just as in the highest beings we can find traces or vestiges of what Darwin called their "lowly origin" in the shape of rudimentary muscles, bones, eye-stalks, and nerve-twigs, so in the matter of the leucocytes we are able to hark back with scientific satisfaction to the beginnings of phagocytosis and its wonders in certain belongings of the animal groundlings.

Let us start with the amœba once again. This animalcule, as we have seen, is a microscopic fragment of living protoplasm, which, as an independent organism, moves, eats, digests, and produces its kind. One and the same bit of protoplasm discharges all the duties of life; and the amœba, as has been duly noted, is the prototype of the white blood corpuscle or leucocyte itself. Apart from the fact that all animals start life in the guise of the amœba— for the ovum or egg is essentially a similar nucleated mass of living matter—we find that our next step upwards brings us into the kingdom of the sponges. Here a mass of amœba-like specks of protoplasm, forming a colony, secretes the sponge skeleton—limy, horny, or flinty, as the case may be—and, like a collective or compound amœba, receives and engulfs particles of food which are conveyed to it in the water streams that are perpetually circulating through the canals and waterways of the miniature submarine Venice.

Not far removed above the sponges is the type of animals which owns the common fresh-water polype or hydra, the zoophytes, the jelly-fishes, the sea-anemones, and the corals as its representatives. The body is now better defined, and if we study what occurs in a hydra, we shall be able to note how the amœba-like power of engulfing food-particles still remains as a permanent feature of the animal. A hydra is a minute living tube, which is fixed by one extremity to a water-weed, and possesses a mouth and tentacles for the capture of prey at the other and free extremity. There are no organs within this tubular body; but that body is built up of cells, which are arranged in an outer layer, the *ectoderm*, and an inner layer, the *endoderm*. Food swallowed by the hydra is deposited in the simple interior of the tube body; but the cells of the lining or (endoderm) are seen to constitute the chief agents in the process of digestion. They throw out processes from their substance, so as to engulf what has been swallowed, and, in fact, comport themselves exactly like stationary leucocytes in our own blood-vessels. Furthermore, digestion may be said to actually occur within these cells. Like the amœba itself, each cell digests what it has seized in the way of food, and contributes its share of the work of assimilation to the sum total represented by the labor of all the cells. In the hydra, then, the cells of the endoderm lining of the tubular body are decidedly the seat of food prehension, and of food digestion also.

If now the development of a higher animal be studied, we find that the body is really built up by the elaboration of three layers of cells, which result from the first beginnings of the building process in the egg. There is an outer layer, called the *epiblast*, which gives origin to the nervous system and outer skin. This corresponds with the ectoderm of our hydra. There is an inner layer, called the *hypoblast*, which chiefly forms the inner lining of the digestive organs. This evidently represents the endoderm of lower life. But there is now a third layer, called the *mesoblast*, only faintly developed in lower forms, but out of which arises the great bulk of the body. It is this mesoblast (or mesoderm) from which heart, blood-vessels, and other organs arise; and it is this layer which originates the white blood corpuscles as well. But as the mesoblast itself is simply a development of the two primitive and original layers themselves (ectoderm and endoderm), a direct continuity is thus traceable between the cells of lower life which (as in hydra) digest food and carry on all the body's work, and the cells in higher life, which, sometimes adherent to the wall of a blood-vessel, arrest alien particles, or, more typically, as the leucocytes of the blood, seize upon, eat, and destroy the invading bacilli which threaten their possessor with destruction.

What I argue for here, is the direct continuity of these adverse cells in respect both of origin and habit. They arise in higher and lower life from practically the same layer, and they have retained a remarkable likeness and similarity of habit as well. In lower life, as a single cell like the amœba, the microscopic speck of protoplasm forms of and by itself a perfect individual. In the hydra there are simply many such cells, eating and digesting as their normal duty in life. In the higher realms of life we see the same action performed by essentially the same cells. That which they accomplish in us as a corps of sanitary police, they effect in virtue of their direct inheritance from their ancestral cells in the amœba and its kith and kin. The destruction of bacilli in us is only the continuation of the habit and mode of life which these cells acquired in the far-back past, when their duty was limited to feeding the organism of which they constituted an essential part. To-day, in the aristocracy of nature, they have only modified their original habit somewhat. Their duties are not so much nutritive as defensive. They represent an active sanitary department or board of health, charged with the functions of guarding their possessor against the inroads and attacks of the foes which threaten our physical prosperity through the initiation and development of disease.

If we may thus demonstrate that higher life has received this wondrous power of combating its microscopic enemies as a direct legacy from lower organizations, it is also possible to show that the leucocytes, or "wandering cells," of lower animals have many traits akin to those seen in the white cells of higher organisms. I have alluded to the fact that several leucocytes may come together for the purpose of more effective attack on their enemies in the shape of bacilli, and thus form a "giant cell," or plasmodium. This phase of their life illustrates anew the old maxim, *L'union fait la force*. In some mollusks the same action has been noticed to occur. A transparent animal, Phyllirhöe by name, fed with granules of carmine, continues to surround the masses of color grains, which are too large for individual leucocytes to ingest, by forming giant cells. One leucocyte unites with another, till the foreign body is surrounded. In man, as in the Daphnia, such united cells are found in connection with certain diseased tissues. In tubercle and in leprosy, giant cells are known to occur, and the explanation of their appearance would seem to be most easily arrived at on the idea that they represent the collective efforts of the leucocytes, exercised in the endeavor to get rid of the offending materials of the disease.

To the ancients the symptoms of inflammation were well known. Classic physicians spoke of the four signs of the process as *calor*, *tumor*, *rubor*, *et dolor*—heat, swelling redness, and pain. The type of the process has not altered since classic ages, for inflammation to-day, as every one knows, still exhibits all four characteristic signs. A simple inflammation soon ends. The symptoms disappear, and the parts return to their normal condition. But when the process proceeds to a further stage we then find "suppuration" to ensue, and the essence of this latter action is the formation of what we know as "matter" or *pus*. The difference between a simple scratch, which heals at once, or, as surgeons say, "by first intention," and a poisoned puncture which develops into a matter-forming accident, is so well known that any description of the process would be absolutely superfluous. Now the old theories of inflammation attributed the symptoms more or less directly to changes in the blood and blood-vessels and to the outflow into the tissues of the fluid of the blood. These views were, for the most part, unsatisfactory, because they implied certain causes or conditions which were themselves matters of uncertainty and dispute. No doubt there is a determination of blood to the inflamed part, or, as the ancients put it, *ubi stimulus ibi affluxus;* but the why and wherefore of this condition was unknown. What the "pus" or "matter" was which appeared as the result of inflammation was a matter still more doubtful than the mere cause of the inflammation itself. Long ago, I can well remember the late Professor Hughes Bennett, of Edinburgh University, insisting on the fact that under the microscope the cells of pus could not be distinguished from the white cells of the blood. Bennett made an observation here, the gist of which he himself did not appreciate; for, in a word, pus cells *are* white blood corpuscles. They are the leucocytes which have come to grief in their battle against a process threatening the body's welfare.

Suppose we produce an artificial inflammation in a tissue which can be inspected under the microscope: we may see, with Metchnikoff, how the whole inflammatory process is merely a struggle between the leucocytes on the one hand and whatever has caused the irritation on the other. The blood current is seen to slow down; the fluid part of the blood escapes from the vessels, and the white blood cells or leucocytes migrate in number from the blood-vessels into the tissues in search of the offending bodies or substances. At first an inflammation may show us simply the blood fluid, and little else, escaping to form the swelling of the ailment. Later on it begins to become turbid somewhat, and it is then seen to contain a few leucocytes, while finally it becomes true "pus." It forms an abscess, which may be large and serious in extent or simple and insignificant, as in the case of an inflamed pimple. But the pus we discover to be composed simply of the emigrated leucocytes. They are in one sense our defeated sanitarians. They have succumbed to the inflammatory action, and they may, as dead and useless things, constitute of themselves a danger to the organism they endeavored to conserve. Inflammation is thus to be ranked not so much as an unnatural and diseased process, but as one which has a true physiological significance, in that it begins, at least, in an endeavor on the part of our leucocytes to save us from the consequences of infection.

The case has never been more aptly put than by Mr. J. Bland Sutton, who remarking on the new reading of what inflammation, is and means, says that "zoologically; it should be likened to a battle. The leucocytes are the defending army, their roads and lines of communications the blood-vessels. Every composite organism maintains a certain proportion of leucocytes as representing its standard army. When the body is invaded by bacilli, bacteria micrococci, chemical or other irritants, information of the aggression is telegraphed by means of the vaso-motor nerves (those governing the movements of the blood-vessels), and leucocytes rush to the attack; re-enforcements and recruits are quickly formed to increase the standing army, sometimes two, three or four times the normal standard. In the conflict cells die, and often are eaten by their companions; frequently the slaughter is so great that the tissue becomes burdened by the dead bodies of the soldiers in the form of pus, the activity of the cells being testified by the fact that its protoplasm often contains bacilli, etc., in various stages of destruction. These dead cells like the corpses of soldiers who fall in the battle, later become hurtful to the organism they in their lifetime were anxious to protect from harm, for they are fruitful sources of septicæmia and pyæmia (blood-poisoning)—the pestilence and scourges so much dreaded by operative surgeons."

The removal of disease products from the tissues of living animals is, however, not the only duty which these phagocytic cells discharge. There is no doubt that in the healing of wounds they play an all-important part. A scratch with a needle is truly a matter of no great moment; yet it is a "solution of continuity," as the surgeon puts it, and as such it may serve as an entrance into the organism of nefarious particles which are capable of producing serious effects. But the healthy scratch soon heals, and the healing process is undoubtedly due in great part to the action of our friendly cells. The layer of what is called "lymph" which forms on the surface of the scratch is composed largely of leucocytes. Now if the healing process proceeds favorably, we shall find the cells to become modified, changed and organized to form the material out of which the cicatrix or scar of the wound is developed. This scar in a slight wound does not remain. It is further disposed of by the formation of the natural elements of the skin substance; but in a wound of serious nature we see how the scar tissue remains permanently to mark the effects of the leucocytes in the work of repairing the gap.

There is yet another phase of the action of the leucocytes deserving of notice. In the cause of development most animals, in passing from their youthful to their adult stages, get rid of certain belongings of immature existence. The first teeth of the higher mammals and the tail of the tadpole afford familiar illustrations of such disappearing structures. It has been found that the absorption of the roots of our first or "milk" teeth, which drop out painlessly in consequence of their roots vanishing away, is due to the action of leucocytes in eating up the useless dental foundation. The tail of the tadpole disappears when the frog begins to assume its terrestrial habiliments. The gills of early life also vanish away when the lungs of the adult stage are developed. Both gills and tail are really eaten away by the leucocytes of the young frog. One can see inside the cells the fragments of the tail muscles which they have devoured. This function of getting rid of the odds and ends and "unconsidered trifles" of animal life is not the least important of the duties discharged by our microscopic allies. It is hard to say how much in the way of physical elevation we may owe to the efforts of these minute beings in removing the useless and effete details of an economy which aspires to leave behind it the "childish things" of its past.

It is highly interesting to note that by some observers the tonsils, situated in the back of the mouth, organs whose functions have hitherto been unknown, are regarded as practically blood-glands, the chief duty of which is the manufacture of leucocytes. The position of the tonsils, it is pointed out, is eminently calculated to give them every advantage of capturing particles of foreign matter, which otherwise would invade the lungs.

It is asserted that the tonsilar surfaces are practically covered with living active leucocytes, manufactured in these glands as they are developed in the spleen; so that a regular sanitary *cordon* is thus constituted by the tonsils at the entrance of the lungs, such as can arrest particles whose presence, if not exactly injurious, would at least be undesirable in the respiratory organs. Even in the lungs the leucocytes are seen to engulf such dust particles as may have been inhaled, and these intruding granules are carried by them to the lymphatic glands of the lungs, where they are deposited and removed from the chances of working further harm, as it were.

The story of the leucocytes and their labors would be incompletely told if reference were not made to the part played by these living cells in insuring us from disease invasion on a wide scale. I may premise that the facts I have chronicled with reference to the work of leucocytes in devouring bacilli, and in acting otherwise as bodily scavengers and sanitarians, are not in dispute. I have simply described what has been seen by competent observers, and what may be seen by any one trained in the use of the microscope. The history of phagocytosis rests on the surest basis of all —that of accurate observation.

Naturally, however, a question has arisen regarding the relation between this phagocytic action of the white blood cells and the immunity of freedom from certain diseases which is exhibited by some animal forms. Is the power of the leucocytes to devour bacilli sufficient to explain such immunity? Or have we to take into account other conditions than the leucocytes themselves and their ways to make plain the why and wherefore of an animal's insusceptibility to certain ailments? These are the questions over which modern science is now exercising itself. Metchnikoff himself, as the leader of what may be called the "phagocytic school," of course strongly advocates the view that it is to the powers exercised by the leucocytes that immunity from disease is directly due. He says that what is called "immunity" is really often only "recovery in operation from the very onset of a disease"; that is to say, the disease has been present, but the leucocytes have successfully and at once checked its progress by their prompt method of disposing of the infecting microbes. He would explain infection on the theory that an animal's leucocytes do not possess the power of destroying the bacilli. If afterwards the same animal acquires an immunity against that particular ailment, Metchnikoff holds that the effect of vaccination or inoculation has simply been to give its living cells the power of devouring the microbes—how or why is another matter altogether. He supports his views by the remark that in ordinary rabbits anthrax infection is followed by a very poor attempt on the part of the leucocytes to dispose of the bacilli, whereas in vaccinated rabbits the leucocytes are extremely active, and protect the animal against attack. But even Metchnikoff himself admits that the leucocytes are very susceptible to external influences, and especially to chemical conditions. They are repelled by certain microbes, probably because these bacilli produce some chemical product which protects the germs against the leucocyte attack; and they are attracted by other microbes, whose chemical secretions do not interfere with the destructive operations of the white blood cells. Again we are told that these two phases of things are not immutable, and that the leucocytes may become accustomed to an influence which at first repelled them. In the latter case they will of course attack and devour the offending microbes.

The real battle of immunity is to-day being fought around the question how far purely chemical conditions represented by the bacilli of disease and by the blood fluid of an animal itself, apart altogether from leucocytes, may serve to explain our original escape from disease, or our acquired immunity from it. Are the leucocytes the primary agents in procuring this freedom from infection, or are they only secondary agents, which take advantage of chemical conditions, with the production of which they have in reality no concern? To this question, I apprehend, no exact or definite reply can at present be returned. But what evidence is at hand from recent researches on what are called the *toxins* of disease seems to point to some modification of Metchnikoff's views being probable as an ultimate result of the controversy. The toxins are the specific poisons produced in the body of an animal by the multiplication of bacilli. When, therefore, an animal not susceptible to a particular disease is inoculated with the germs of that ailment, the toxins produced must undergo some modification or other which renders them entirely inoffensive to it. Immunity here is due, therefore, in this view of things, not to phagocytic action, and not to any work of leucocytes, but to a purely chemical condition. It has, besides, been found that the blood fluid of an animal which cannot be infected, say with anthrax, actually contains a substance which can be used in making cultures of disease microbes to inoculate susceptible animals against the ailment. The "antitoxin treatment" of diphtheria with the products obtained from the blood of the horse after inoculation with diphtheria germs—the horse himself being insusceptible to the disease—is a familiar illustration of this fact. So that it does not require a very elaborate examination of the evidence already before us to raise doubts whether immunity is always and invariably a consequence of leucocyte action alone on bacilli. It may be that the leucocytes themselves play a chemical part in the process, in addition to their direct action on microbes. It may be that these living cells produce some substance which, given forth to the blood fluid, renders that liquid the direct means of combating the microbes. But the case as it stands strongly suggests the possession by the blood fluid of animals, apart from leucocytes altogether, of properties which act in protecting them from the attacks of certain ailments.

The case of relapsing fever is one which, by way of conclusion, may be taken as typical of the difficulties of the present position of matters. In this disease the special microbe is a corkscrew-shaped organism called a *spirillum*, which possesses motile powers. When the patient suffers from the acute paroxysm or "relapse," the spirilla occur in plenty in the blood. In the alternating and quiet stage they disappear from that fluid. In inoculated monkeys, which suffer, by-the-way, from one attack only without alternating phases, it was found that during the paroxysm the spirilla were free in the blood, while none could be found in the white corpuscles; but when the fever had abated, the spirilla, apparently leaving the blood, were found in the leucocytes of the spleen. The suggestion here is that at the onset of the disease and during its acute stages the spirilla present in the blood evade capture by the leucocytes in virtue of their movements, while as the disease fades they are captured by the white cells of the spleen, where they are duly disposed of. Phagocytic action alone, on this view of things, would seem to account for the disappearance of the ailment. But the opposing theory holds that the spirilla in the blood undergo some modification or other—quinine appears to produce some such effect—due to the properties of the blood itself, and that their disposal by the leucocytes in the spleen is really only the finishing touch to microbes previously weakened and rendered practically harmless by the blood fluid.

Admitting that the nature of the protection, original or acquired, against disease which certain animals possess is far from being settled, this fact, we may maintain, leaves untouched the general conclusions with regard to the wonderful actions of the white blood cells I have chronicled in this paper. That they act both in lower life and in higher existence as a veritable sanitary police corps is an accepted scientific fact, founded, as we have seen, on observation. These curious cells may or may not be dependent on the blood fluid itself, for much of their power of attacking our microbe visitors, which, like unwelcome and unbidden guests, invade our territory and bring disaster in their train. Sufficiently wonderful, apart from all debatable matters, is the fact that we do possess an array of microscopic allies ready to do battle on our behalf against intruding microbes. How much of that condition we familiarly call "health" is due to the work of our wandering cells is not difficult to guess. The preservation of our physical well-being may be a matter much more closely dependent on the activity of our leucocytes than is generally supposed. Life, complex and intricate as it is, is made up of very small things in more senses than one; and the story of the white blood cells illustrates once more the truth of the saying of Swift, that "man is a microcosm or little world resembling in miniature every part of the great, and the body natural may be compared to the body-politic."—*Harper's New Monthly Magazine.*

THE QUALITY AND QUANTITY OF AN INFANT'S FOOD.*

By B. Van D. Hedges, M. D.

Given a healthy baby, one that has successfully passed the upper and lower narrows and disembarked from the troubled waters without bruise or blemish, what treatment has this child a right to demand at our hands during the earlier months of its existence, first as to the quality, and again as to the quantity of food it shall receive at each nursing? These are the two specific problems that will demand our exclusive attention, realizing that we are dealing with the healthy and not the sick child.

It also seems opportune that we should give our best thought to this subject at this particular time of year, when we are brought face to face with a high infant mortality, a mortality that we can only too often directly trace to errors in diet that might have been avoided.

---

*Read before the Union, New Jersey County Medical Society.

I say, what treatment has this child a *right* to demand? If the mother is in good health, with sound nipples and a good flow of milk, the child's right is unquestionably clear and plain. The time has not yet arrived, nor do I believe it will ever come, when the refinements of the laboratory can improve upon Nature's method of rearing her young. I have no sympathy with the mother who, under such circumstances, refuses the nourishment specially designed by Nature for that special child; far better for her not to enter at all upon the obligations of married life than to shirk what is her plain duty and what ought to be her pleasure.

And yet, willing or unwilling, the presence of certain conditions would contraindicate the following out of Nature's plan. Syphilis and tuberculosis are very positive barriers in the best interests of both mother and child. Again, we meet with cases where the mother appears perfectly healthy, the quantity of milk sufficient, and yet the child does not thrive. In all such cases it is our duty to make a careful analysis of the milk, and for this purpose Holt's apparatus is the most convenient and accurate for the busy practitioner. If the sample, taken from the middle nursing, shows a specific gravity of 1.018 to 1.024 and a cream of only two or three per cent. the case is hopeless.

But with the growing demand of our enlightened civilization, breast nursing, especially among the better class of people, is becoming more and more a thing of the past. Artificial feeding has come, and has come to stay. How we can best adapt ourselves to these forced conditions is the problem that presents itself to us to-day and our success or failure in its solution will depend upon the exactness with which we can make our artificial food correspond with Nature's product.

We will first consider the character and quality of our substitute food. Cow's milk, taken from the mixed product of the dairy and not from any one single cow, should be our main reliance. It is moderately uniform in quality, can always be obtained at a reasonable cost, and can be made to resemble mother's milk more closely than any other preparation. And yet the difficulty of obtaining a pure, fresh supply, one that is absolutely reliable, especially in the warm summer months, has been in the past and is still a serious problem.

Most excellent work, along these very lines, has been done in our own State during the past few years by Dr. Henry L. Coit, of Newark. With the co-operation of the physicians of Essex County, a model dairy has been established about six miles from Montclair. The herd is regularly inspected by a skilled veterinarian, and all animals presenting even a suspicion of disease are rejected. The character of their pasturage and food is carefully supervised. The cow's udder and the hands of the milker are subjected to a most thorough cleansing before each milking, and the milk itself passes first through a strainer into a closed pail, and thence immediately to a cold storage apartment. The services of a bacteriologist are constantly employed to determine the number and character of the bacteria present. The owner of the dairy places himself under heavy bonds to see that these regulations are faithfully and strictly carried out, and in return the physicians promise him their aid and cooperation. In this way the initial, primal supply is rendered almost absolutely pure and at a cost of only a trifle more than the regulation prices. Dr. Coit writes me that the undertaking is a most marked success in every way, and there is no reason why such a plan should not be put in successful operation in other large towns. A tour of inspection to the different dairies, such as I made last summer, and a close observation of the methods of milking and the care of the cows, will impress one with their absolute filthiness and neglect of many of the commonest laws of decency. And yet this is almost the sole food supply for a large portion of our population. We have it in our power, as physicians, to remedy this evil. Dr. Coit and the physicians of Essex County have shown us the practical working success of a model dairy, and I believe the day is not far distant when we will demand and secure similar advantages throughout the State.

But in order to make our cow's milk approach the normal standard of breast milk it needs modifying, and we need, ourselves, definite, clear ideas as to the exact chemical composition of each.

	Woman's milk	Cow's milk
Reaction.	Alkaline	Acid
Coagulable albuminoids	Proportionately small	Large
Coagulated by acids . .	Not perceptible in test tube	Very marked; not perceptible when diluted 1 to 5
Water	87 to 88	86 to 87
Total solids	12 to 13	13 to 14
Fat	4	4
Albuminoids	1	4
Milk sugar	7	4·5
Ash	0·2	0·7
Bacteria	Not present	Present

The foregoing table, prepared by Dr. Rotch, of Boston, gives the result of careful analysis of breast milk, taken from the middle nursing, compared with cow's milk about twenty-four hours' old.

It will be seen at a glance that the main difference lies in the albuminoids, the milk sugar, and the reaction, the fat remaining the same in each case. But reduce the albuminoids to their proper proportion and our fat and milk sugar suffer.

Dr. Meigs, of Philadelphia, was a pioneer in solving this problem, and he has furnished us with a formula which, slightly modified, is one of the best we have to-day. I say the best, because it corresponds most closely with mother's milk, and the proportions are so very simple and easy to remember:

Milk	1 part.
Cream	2 parts.
Limewater	2 "
Sugar water (dr. j to °z j) . .	3 "

The reaction is alkaline, the albuminoids are reduced to one per cent., the fat and milk sugar both in proper ratio.

Originally under the supervision of Dr. Rotch, of Boston, there have been started in our large cities milk laboratories where the acme of refinement and accuracy has been reached in the matter of infant feeding. The milk reaches the city from a model dairy in the suburbs about six hours after milking; it is then separated into its various constituents by delicate machinery and synthetically reconstructed according to the needs of each individual baby, as indicated by the prescription blanks, which are filled out by the physician in attendance and then sent to the laboratory.

The ability to thus regulate the albuminoids in the earlier weeks of life, without diminishing at the same time either the fat or sugar, is one of the most admirable features of our prescription laboratory.

A few drops of acetic acid added to a test tube of mother's milk produce no appreciable curd; to the same amount of undiluted cow's milk, large thick white curds are immediately precipitated, and it is only when the dilution is carried as far as one to five that we escape this mass of coagulation. Excessive albuminoid digestion, and the resulting inability of the stomach to cope with the tough coagulum, I believe is the starting point of many of our gastric disorders. With new-born infants it has been my custom, and invariably with good results, to reduce the albuminoids as low as a half of one per cent., gradually working up to the standard at the end of a few weeks.

The milk laboratory is a scientific, rational method of infant feeding, a method which has already gained a firm foothold in Boston, New York, and Philadelphia, and one that has come to stay. The total amount necessary for the twenty-four hours is delivered each morning in separate bottles that have all been sterilized and neatly packed in wicker baskets.

So far, we have imitated Nature in the preparation of our food, as far as the ratio of the different ingredients is concerned. But mother's milk is absolutely sterile; cow's milk under the very best auspices contains bacteria. It is interesting to know that germs are always found in the main duct of a cow's teat for a distance of half an inch from the tip, even with the very best of care. And so the necessity of either sterilization or pasteurization is at once apparent. Personally the writer prefers the latter method, mainly because the product is more palatable to the child. In a series of experiments carried on by Dr. R. G. Freeman, of New York, it has also been found to be equally efficacious in destroying the disease-producing germs.

The doctor's pasteurizer, specially designed by him for this purpose, makes the details of the process very simple and within the mental grasp of the dullest nurse ; or an ordinary Arnold steam sterilizer, with a perforated lid, answers the same purpose.

We have said nothing so far of the different artificial foods, whose number, like the different cures for whooping cough, is legion. I am opposed to their use in a healthy child, because they introduce into the infant's stomach elements which Nature never intended to be put there. Again, analyses made from time to time often show a marked variation in their composition. Commercial enterprise, and not the good of the infant, is the governing motive of the manufacturers. As a result, the public suffers.

Of the different preparations I am inclined to give condensed milk a leading place. It is practically sterile and moderately uniform in its composition. It is cheap, easy to prepare, and among the poor and destitute, where cleanliness is often an unknown quality, but boiled water always a possibility, it offers many advantages. Its low percentage of albuminoids, when diluted one to twelve, gives us a food easy to digest, neutral in reaction, but lacking in potential energy by virtue of its small amount of fat. The baby apparently thrives, often grows fat, and yet I think it is a common experience with all of us that such infants lack the staying qualities which their size and appearance would give us a right to expect. The production of animal heat is very necessary to the active metabolism of the growing child, and unless we add a certain amount of cream our mixture is far from perfect. A scant teaspoonful to the ounce corrects this deficiency, and gives us about four per cent. of fat—the percentage in normal breast milk.

The use of peptonized foods, which at one time seemed destined to crowd out all other forms of feeding, is fortunately being rapidly relegated to its proper position. Its value in certain forms of gastric disturbance may be unquestionable ; but Nature never intended to have this normal function usurped in the healthy child, and I believe the foundation for a weak digestion and much subsequent dyspepsia, has in many instances been laid by the use of peptonized foods. Idleness means atrophy and degeneration in a gastric follicle as well as in a striped muscular fibre.

Imperial granum, Nestle's food, and Carnrick's food, all contain unconverted starch ; and why an infant only a few days old should be called upon to digest an element for which it is totally unprepared is a mystery to the writer. We know that the starch-converting functions of the salivary and pancreatic glands only begin to be developed at about the third month. Mother's milk never contains this element which in itself should be our warrant for witholding it absolutely.

Mellin's food, unless diluted with milk, gives us a food very low in the albuminoids and fat. Even then, with its fifty per cent. of starch converted into glucose, we are doing for Nature what she intended to do for herself. Why not add the milk sugar originally, and allow Nature, in her own good way and time, to complete the process?

And so we might go on through the long and ever-increasing list of patent foods, finding in them all either a serious omission or a meddlesome addition. They are made possible only by the tolerance and active assistance of the medical profession, and it seems to the writer that it is high time we awoke to a sense of our responsibility in the matter. The more closely we can copy Nature in our efforts to raise the bottle baby the more successful will we be. With cow's milk, properly modified and properly prepared, I believe we have a mixture which more closely approaches the standard than any of the artificial preparations.

We now come to the consideration of the proper amount for each feeding. Our mixture may be ideal in every respect, and yet a child's health is made or marred as often by the quantity as by the quality of its food. While resident physician at the New York Foundling Hospital I became very much interested in this subject. I shall never forget one wizened, pinched little creature, only six weeks' old, brought to us with the diagnosis of a "touch of marasmus," and indeed it was a "touch," for the grim monster already had the life of the little one firmly in its grasp. "The child was a trifle fretful and nervous," the nurse went on to explain, "and we found it was quiet only with a bottle in its mouth." And so they had been in the habit of feeding this infant a mixture of six ounces every hour to an hour and a half. The bottle was no sooner emptied than it vomited the entire amount. With its hunger still unsatisfied it cried for more, only to have the same process repeated until death came to relieve it of its misery. How often we see a repetition of this same scene! Hundreds of babies die every year from *overfeeding* where only one succumbs from being fed too little. I only wish I might have preserved this stomach as we saw it the next day at the autopsy. Dilated to three or four times its normal size by this continual stretching process, with the muscular tone so destroyed that peristalis was no longer possible, the walls so thin that they looked like tissue paper, no wonder that all the normal functions were held in abeyance. We all know that if we subject elastic tissue to prolonged and excessive stretching, it soon looses its resiliency and refuses to return to its normal condition. And yet we seem callous to the fact that this principle holds just as true when we subject the stomach to an unnatural strain. I believe that many of our cases of dilated stomachs in after life, and atonic dyspepsias, can be traced directly to this overdistention in infancy.

Being interested to know just how much the stomach in its normal condition ought to hold, we selected children for autopsies who had died of some trouble other than gastrointestinal. The results were most interesting, and I have brought with me this afternoon some of these stomachs, one of which has been kindly prepared by Dr. David Bovaird, and in separate bottles the amount each held by actual measurement. These measurements were made at the time of the autopsy, and before the stomach had been subjected to the action of any hardening or preservative agents. With the pylorus closed the water was allowed to pass in through the cardiac opening from a funnel held about two feet above, insuring the natural amount of pressure. We found the size of the stomach bore a direct ratio to the size and weight of the child. Snitkin, from a long series of carefully conducted experiments, concludes that the average capacity is about one one-hundredth of the child's weight. Thus a child having an initial weight of seven pounds would have a gastric capacity of a little over an ounce, while its brother, who may have weighed twelve pounds, would have nearly double. He also found that the capacity increased at the rate of about fifteen grains a day., We found the average capacity for an average child under one month between one and two ounces; at the third month, between three and four ounces, or, in other words, a gain of about an ounce a month until the sixth month. If I ordered my grain dealer to put fifty bushels of oats in a bin that only holds ten, he would rightly deem me a fit subject for hospital treatment, and yet we constantly see nurses and mothers forcing a five or six-ounce mixture into the stomach of a child only a month old. The one is as rational as the other.

Another series of experiments that we carried on were of interest in determining the amount of milk a healthy child gets from the breast at each nursing. With delicately adjusted scales we weighed a series of babies at different ages, before and after nursing, and found the result corresponded very closely with the normal size of the stomach at these different periods. And just in this connection I would like to mention the advantage of weighing the babies regularly every week on an accurate pair of scales. A gain of a half to three quarters of an ounce a day indicates that we are making satisfactory progress. Below this average something is wrong, and often it is the first index, the first straw that shows us the fact that the child is losing ground.

In conclusion, then, I would like to emphasize my belief that we are absolutely powerless to improve upon Nature's method of caring for her young. At the New York Foundling Hospital during the last twenty years the attempt has been faithfully made time and again to find a satisfactory substitute for mother's milk, only to end each time in a dismal failure. The healthful condition of the two thousand little waifs under their control is proof positive of the value of breast nursing, the only system employed there to-day.

But with the impossibility of obtaining mother's milk, we would advise the use of cow's milk, so diluted with cream, limewater, and sugar water as to form a ratio of one, two and three, using this sterilized or pasteurized mixture in preference to all forms of so-called patent foods, because it resembles most closely Nature's own product.

Again, and finally let us remember the normal size and capacity of the infant's stomach.

◆

HORSEFLESH AS FOOD.

INQUIRY, by the Society for the Prevention of Cruelty to Animals in England, of the Home Secretary as to the final disposition of condemned horses elicited the information that they were being shipped to Holland. The presumption is that they are sold as food, and the belief is entertained that it is returned to England in the form of sausages or canned meat. It is said that Paris consumes more horseflesh than any other city in the world. An approximate estimate places the number of horses killed for consumption as food at about twenty-four thousand, and the gross weight of the same at over fifty thousand tons. The sale of horse meat is authorized in Paris, the market for that meat being apart from that occupied by the regular *viande de boucherie.* A decade hence and England may be in a position to furnish some interesting statistics on the consumption of horseflesh as food—indeed, if the modern *restaurateur* of our own country keeps equal pace with the times, our cousins may be far outrivaled, and horseflesh in America mav not only be a marketable commodity but a table *delicatesse.*—*Am. Med.-Surg. Bulletin.*

◆

SIESTA AND DIGESTION.

THE question has very often been raised whether rest after a meal is favorable to digestion. Some persons cite the example of animals who lie down and go to sleep after eating, while others claim that sleep during digestion makes the mind sluggish and predisposes to apoplexy.

M. Schule, of Fribourg, has endeavored to solve the question by chemistry. In two cases where the stomach was normal he removed the contents and analyzed them a few hours after meals, followed in some cases by sleep and in others by simple rest in a horizontal position. According to these experiments the regular effect of sleep is to lessen the power of contraction of the stomach, while the acidity of the gastric juice increases; on the other hand, rest in a horizontal position stimulates the motion of the stomach without increasing its acidity,

The inference is that it is well to rest after eating, but without going to sleep, particularly when one is affected with a dilated stomach or with hyperacidity of the gastric juice.—*Medical Times.*

◆

GLYCERIN IN CERTAIN AFFECTIONS OF THE STOMACH.

IN THE *Lancet*, July 4, Sir James Sawyer remarks that some years ago Dr. Sidney Ringer recommended the administration of glycerin by the mouth in certain affections of the stomach. Acting upon his suggestion, he has since treated many cases of painful gastric digestion, such as are usually attributed to subacute or chronic catarrh of the gastric mucous membrane, with glycerin with satisfactory results. So far as he has seen this employment of glycerin is not widely extended in professional practice, and he has not noticed further reference to it in periodicals. The familiar routine seems to be a ringing of changes upon bismuth, alkalies, acids and digestives. Many cases of gastric maladies of the kind indicated yield to glycerin; he gives a drachm, a drachm and a half, and sometimes even two drachms, with a little of some simple bitter stomachic tincture, diluted to an ounce with water, thrice daily, between meals.—*New York Medical Journal.*

ARSENIC IN THE TREATMENT OF GASTRALGIA.

IN the *Lancet* for July 4th Sir James Sawyer, M.D., of Birmingham, says: "Further observation in practice has confirmed my favorable opinion of the curative efficacy of arsenic in the various painful neuroses included under the name gastralgia. I have already laid before the profession my earlier experience on the subject. Romberg's well-known description of gastralgia is classical. He distinguished two forms of the malady—gastrodynia neuralgica, which he held to be hyperæsthesia of the gastric branches of the pneumogastric nerve, and neuralgia cœliaca, which he attributed to hyperæsthesia of the solar plexus. Clinical experience confirms the views of Niemeyer and of Henoch that this distinction is difficult and of doubtful utility in practice. Gastralgic affections, severe and slight, are rare in hospital practice, and frequent among private patients, especially in those of nervous temperament. I need scarcely observe that for obvious reasons the diagnosis of gastralgia is one which should neither be lightly made nor negligently maintained. But pain arising in the stomach when the organ is empty and relieved by the ingestion of food is almost diagnostic, as the late Dr. Wilson Fox taught, of its nervous nature and origin. With due regard to the casual concomitants and antecedents of gastralgia arsenic cures the disease. It is best to give the drug in a pilular form. I exhibit a twenty-fourth of a grain of arsenious acid made into a pill with two or three grains of some tonic vegetable extract, such as gentian, three times daily halfway between meals. Scarcely any other medicinal treat-is needed in cases of moderate severity and the use of the remedy should be continued for some weeks. In severer cases I use counter-irritation to the epigastrium of duly proportioned activity. I have usually found a full and varied dietary suit gastralgic patients far better than a restricted 'dyspeptic' regimen. It is in such cases that Trousseau's maxim is so true—that we should know what a patient does eat before we advise him upon what he may feed."—*N. Y. Medical Journal.*

Department of Hygiene.

WITH SPECIAL REFERENCE TO STATE AND PREVENTIVE MEDICINE.

THE CONTAMINATION OF WATER SUPPLY FOR COUNTRY SCHOOLS.*

By J. F. Ford, M. D.,
Omro, Wisconsin.

The science of medicine has reached the point where how to prevent disease, rather than how to cure it, is the important question. Hygiene offers the best reply to the question. A series of sporadic cases of enteric fever, associated with an unusual number of cases of gastro-enteric diseases, led to an investigation into the probable sources of contamination of the water supplied to these patients. Over 100 country wells, including all the country schools of the township, were examined as to (1) Construction; (2) Proximity of cess-pools, privies, barnyards, etc.; (3) Nature of soil; (4) Slope of adjacent ground, and (5) Defects in construction at or near the surface.

Only five wells (including one school well) were found above suspicion.

The following is a short history of two of the school wells:

Case I.—A large number of gastro-enteric cases occurred among the pupils during April, May and June. During September, October and November, four cases of diphtheria and three cases of enteric fever occurred. The well was the old-fashioned abomination—a "dug" well lined with loose stones. The roots of a couple of large trees had formed a close network among the lining stones of the well, which was 60 feet from a couple of old privies that had stood in one place for 15 years, 10 feet from a constantly traveled road, and in the lowest part of the school grounds. A large depression or cesspool had been formed near the mouth of the well by the feet of the horses that were frequently watered there, and the contents of this pool—usually consisting of offensively odorous mud and water—had ready and frequent access to the well below. The well was abandoned, another was bored and piped with two inch iron pipe to the depth of 30 feet. The health of the pupils has again returned to its normal standard.

Case II.—In this neighborhood twelve cases of a mild type of secondary diphtheria, four cases of enteric fever, and a number of cases of gastro-enteric troubles occurred among the pupils. A well, much in the same condition as No. 1, was, against the advice of the health officer, "cleaned out" by simply pumping out the water and scraping the bottom. The next year the former diseases appeared but decreased in numbers and severity. The well was deepened, stone lining removed and curbed throughout with 22 inch tile and cemented joints. No more trouble has occurred for two years past.

Wells supplied by water from deep strata contain few bacteria unless contaminated by surface water in which they are usually abundant. Even then, as showing by laboratory experiments, pathogenic bacteria are unlikely to increase, but rather disappear in from two to six days, being "crowded out" by other bacteria whose natural habitat is in the same water.

According to Bolton and Frankland this is probably true also of even the typhoid bacillus, the anthrax bacillus without spores, and the cholera spirillum. Kraus, Wolffhugel and Reidel found similar results in hydrant water.

---

* Read before the Wisconsin Medical Society, June 5, 1896.
—*Charlotte Medical Journal.*

Frankland, in a series of investigations into the water supply of London, published in 1894, shows that water, by a process of sedimentation from disuse, may become very poor in bacteria, while the muddy sediment at the bottom of wells and reservoirs still contain enormous quantities.

Rubner in an investigation of stagnant water, in an unused well at Marburg, found that a specimen of the undisturbed contents showed only 1,620 bacteria per c.c., while a specimen taken after the contents had been stirred to a point of excessive turbidity, showed 1,475,000 per c.c., and these belonged to the well itself and were not introduced by contamination from surface.

Even the deepest artesian wells contain a few bacteria—from 4-43 per c.c.—while no matter how deep an ordinary well is dug it will contain more or less bacteria, even when successfully protected from surface contamination ; but it must be remembered, (1) that such well water by the processes of sedimentation, before mentioned, together with some nitrification, always present to some extent, becomes practically free from bacteria, while the sediment at the bottom becomes far richer in bacterial constituents ; (2) that the presence, therefore, of large numbers of bacteria in such a case denotes disturbance and not contamination, whilst, conversely a small number denotes prolonged quiescence, and not necessarily absence of contamination, and (3) that the danger in contaminated water lies not so much in the quantity as in the type of micro-organism, and the frequency of contamination.

The experiments of Frankel, Koch, Benmer and Maggiora show that while soil at the surface may, in favorable locations, teem with bacteria, there is a dividing line, varying from three-fourth metres in virgin soil, to about one and a-half meters in more densely populated areas, below which very few bacteria are found, and that as a consequence the "ground water" region is nearly unpolluted. Typhoid bacillus has been found to grow throughout the year at a depth of three metres, and the anthrax at one and a-half metres, but no pathogenic bacteria have been found in the deeper layers of the earth. (Frankel). It is also shown that the numbers of bacteria are greatly increased, (1) by cultivation and strength and character of fertilizers, (2) by the density and permeability of the soil, and (3) by the density of population.

The rural population derives its water almost exclusively from shallow wells—(those less than 50 feet in depth, and sunk in superficial layers of soil overlying impermeable strata of clay or dense rock)—and at the same time it is the almost invariable rule to dispose of the sewage of the premises in such close proximity to, and in such a manner, that the water is in a state of constant contamination and grossest pollution, although at the same time clear, sparkling and palatable. For the organic filth from cesspools, drains, etc., in its passage through even a few feet of soil is deprived of suspended matters, but not of its dangerous properties, while the well has became only a gigantic culture tube for the propagation of all forms of bacteria—pathogenic and non-pathogenic. Shallow wells are never above suspicion as to the purity of their waters.

The distance within which a well draws water to itself when its own water level has been depressed by pumping, depends on the amount of depression and nature of the soil, and has approximately a radius of 15 to 39 times its depression if in fine sand or gravel offering considerable resistance ; 57 times the depression if in chalk with fissures ; 68 to 100 times the depression if in coarse gravel allowing free passage ; and 143 times the depression it red sandstone with fissures.

Frankel has shown that the filtration at low pressure of water through fine sand one metre in thickness removes almost all pathogenic bacteria.

All wells that are "dug" must be so situated that the underground waterflow shall be toward the possible sources of pollution and at a distance of 100 to 160 times any depression of its water that may likely occur by pumping. The sides should be lined down to the surface of the underflow with stone or brick carefully laid in hydraulic cement; or Portland cement tiles of desirable dimensions should be used and the joints carefully sealed with hydraulic cement. The mouth of the well should be closed over with large flat stones laid in cement, or some other expedient used to effectually exclude any foreign substances, and should be at least two feet above the surface of the ground, and protected with a coping. The water should be raised by a metal pump supplied with a contrivance to produce a suitable degree of aeration of the water within the well. The waste water from pumping should be carefully conducted away to a safe distance, and the pump should not reach nearer than 18 inches of the bottom of the well, thereby leaving the sedimentary deposit undisturbed.

THE HEALTH OF NEW YORK.

The Health Department, which has not published an annual report since 1892, has been in the habit of putting forth weekly reports, and the one recently filed for the week ending Saturday, July 4, shows a noticeably reduced city death rate. Some persons ascribe this to the diligence and the precautions of the Health Department; others to the condition of the streets and to the control of the Street Cleaning Department; others to the more stringent enforcement of the regulations governing buildings used for residence.

The population of New York City by the police census of April, 1895—the last census of the kind taken by public authority in New York—was 1,851,060. Since that time a large area of additional territory in the annexed district has been joined to New York from Westchester County, and the population of this territory is computed at 17,000. With this addition and the allowance made by the Health Department for the increase of population in New York the total number of inhabitants of this town on the evening of Saturday, July 4, was 1,934,551. The number of deaths in the seven days preceding was 896, which, compared with the corresponding week of 1895, when the total was 954, shows a falling off of 58, while compared with the average of the past ten years for the corresponding week of July it was still less. The average death rate in the first week of July for the ten years preceding was, for that period, 1,065 on the basis of what is now the population of the city. These Health Department statistics are made up on the basis of percentages, and it is therefore possible to increase or diminish the latter so that it will accord with the population at the time taken. In other words, the average death rate in the week ending on July 4 or including the early days of the month of July is raised to conform, for purposes of comparison, with the population of New York at this time.

A reduction this year to 896 deaths in a week, compared with an average of 1,065 in the corresponding week for the ten years preceding, is certainly a marked gain, and the satisfaction of the officials of the Health Department concerning it is in nowise unnatural. But a closer examination of the figures furnished for the week ending July 4, as compared with the records of the previous years, are not altogether as satisfying as the totals would seem to indicate. In fatal cases of diphtheria, for instance, which the officials of the Health Board declare have visibly decreased through the use of antitoxin, it appears that the corresponding number of deaths during the previous ten years was 38.5. This year it is 39—an increase. In pneumonia the number for the former ten years, 54.1, is now exceeded, by 63, in the first week of July, and those distressing scourges, phthisis and tuberculosis diseases, with an average during the past ten years of 100.1, appear this year with 110. Death from the various forms of heart or cardiac diseases have increased from 40.1 to 44; suicides, with which obviously the Health Department has little to do, have decreased from 6.2 to 6, and deaths by violence have increased from 39.8 to 45. These figures do not certainly show any radical decrease in the death rate, but in the number of cases grouped as of "children under five years," there is a radical reduction from 293, the former average, to 181.

Whether this reduced rate is to be ascribed to the condition of the weather, which has been much more favorable to the health of children this year than in previous summers during the month of July, or to an improvement in sanitary conditions over which the Health Department has charge, is, to some extent, a matter of opinion, no evidence of which, one way or the other, is to be gleaned from the fragmentary weekly report of the Health Department. Deaths from the various nervous diseases, as they are grouped by the Health Department, were 67 last week, and likewise 67 during the corresponding week of last year. The rate for bronchitis has declined from 25.5, the average for the past ten years, to 16, and of measles, from 17.5 to 11.

The total number of deaths during the week covered by the last report of the Health Department, was 896, and of births, 1,060, showing a preponderance in the birth rate of 164. These figures are agreeable, but no more so than the rate of marriages reported, 447 during the week ending July 4. The number of persons who died during the week ending July 4 in this town was 896; the number of persons married was 891, only two less. One additional marriage would have made the number of persons married during the week correspond exactly to the number of persons who died, and few cities in this country or any other have a record so high. The last weekly report of the Health Department is more instructive when examined in detail than when accepted on the basis of the totals.—*The Sun.*

DISEASE IN THE GRAVE.

WHILE all are agreed as to the danger, or at least the inexpediency, of intramural interment, of burial in vaults, and in the "dead" earth of city churchyards, the apologists of earth burial insist on the destruction of pathogenic by saprophytic microbes and the energy of the nitrifying process in suitable soils, and the advocates of cremation believe in the greater vitality of some disease germs and the real risk of the pollution of the ground water and wells, though this danger is minimized by the general substitution of public water-supplies for private wells in all towns or large villages. Even Hoffmann, the official defender in Germany of the existing practice, admits the persistence and diffusion of the bacteria of typhoid and cholera, and recently Prof. Albu, in a prize essay on cremation, has collected a large mass of well-authenticated instances of this. It is true that Škrzeczka, Wernicke and Pistor have endeavored to account for the greater mortality from typhoid fever and cholera pointed out by Zuelzer among the population residing in the immediate vicinity of the Berlin cemeteries on such hypotheses as lowness of site, movements of ground water, density of population, which Albu deems insufficient; but the pollution of the ground water and wells in Vienna from 1875 until the provision of a pure public supply from distant highlands, by percolation from the cemeteries which encircle the city on rising ground became more and more pronounced, the water at length being turbid and yellow, charged with nitrites, and positively offensive from hydrogen and ammonium sulphides. Dr. Levison, in a report published in 1886 on the graveyards of Denmark, stated that Copenhagen and twenty of the sixty-eight towns in the kingdom had suffered from this cause, and that seventy-eight epidemics of typhoid were distinctly traceable to the proximity of graveyards. Dr. Lamm says that around the three cemeteries near St. Petersburg the annual mortality had for some years been from 75 to 85 per 1,000, while that of other and even poorer quarters of the city was only 25. To Dr. Doenitz, who for many years held a professorship of medicine at Tokio, we are indebted for one of the most striking instances of the persistence of infection in the earth. During the epidemic of 1877 a detachment of troops sent to quell a disturbance in a remote district had suffered very heavily from cholera, but from that year until 1879 the disease was entirely absent from the whole empire. The authorities then determined on removing the bodies of the soldiers to a public cemetery, employing a number of laborers for the purpose. While so engaged cholera suddenly broke out among them in the absence of any other possible means of infection, and the same occurred at another place under similar circumstances, these two localities forming the centers of the origin of the epidemic of that year. The outbreak of cholera at Jativa, in 1890, when Spain and Europe generally had been free for five years, though not connected with cadaveric infection, having been ascribed with every appearance of probability to the excavation of soil saturated with the evacuations of sufferers in the preceding epidemic, is analogous; while Sir Joseph Lister's case of the hospital haunted with gangrene which baffled all efforts at its suppression until the bodies in an adjacent churchyard had been exhumed and burnt, and Mr. Wheelhouse's, of the Yorkshire village, where scarlatina of the most virulent type reappeared after the lapse of thirty years, while the remains of the victims of the fever in the preceding generation were being exhumed for the purpose of adding part of the closed church yard to the parsonage garden, with like instances of the resuscitation of yellow fever and the plague, suffice to prove if there have been some exaggeration, there is nothing incredible or even improbable in the most ghastly stories of the plague in medieval times, and, indeed, until the close of the seventeenth century.—*British Med. Journal.*

◆

THE SUGAR-PRODUCING FERMENT OF THE LIVER.

In a communication made to the Physiological Society at its recent meeting at Oxford, Dr. Pavy related some experiments which elucidate the *post-mortem* glycogenic action that occurs in the liver. It is well established that a considerable formation of sugar takes place in the liver after death. This is due to a hydration of glycogen into sugar—a phenomenon that is brought about by ferment action, and, according to Dr. Pavy's views, which were stated at length recently in a series of papers in the *British Medical Journal*, is the converse of what takes place during life when the vital activity of the liver protoplasm produces a dehydration of carbohydrate matter by transforming sugar into glycogen. The idea is, however, entertained in some quarters that the transformation of glycogen into sugar, which occurs in the liver after death, is yet an act of vitality due to the continuance for a time of molecular life. The conversion of glycogen into sugar, however, is readily effected by chemical and by ferment action, and *a priori* it appears superfluous to invoke vital action to account for such a conversion in the liver after death. Moreover, Dr. Pavy has advanced good grounds for believing that the production of sugar could not go on in the liver during life as it does after death without the production of diabetes. When the liver substance is treated with alcohol the ferment which it contains is precipitated, but retains its properties, and when dried may be kept for an indefinite time. In the experiment which Dr. Pavy described the liver of an animal recently killed (the animals used were rabbits and cats) was well pounded with spirit, which removed the sugar present at the time. The product was dried without the use of heat and reduced to a powder, which it was found could be kept for use as required. When this powder was treated with water and kept in an incubator for two or three hours an active production of sugar took place. As a control experiment a similar quantity of the powder was plunged into boiling water which would destroy the ferment, and this specimen did not on incubation give evidence of the production of sugar. It is impossible to conceive that a dry powder obtained by treating liver substance with alcohol, a powder which may be kept unaltered in a stoppered bottle for months, can retain vitality. In comparing the amount of sugar produced in fresh liver when incubated, and that produced in the dried alcoholic precipitate, allowance has to be made for the difference between the dried and the moist state, and when this is done the results are concordant. Ordinarily in an alcoholic coagulated liver fairly rich in glycogen, the sugar produced (reckoned as glucose) amounts, on incubation for two or three hours, to 35 to 45 per mille. In one recently experimented with it amounted to 53 per mille. These experiments support the contention that the production of sugar in the liver after death is due to a ferment action, and not to the vital activity of the liver protoplasm. Briefly stated, the facts are as follows: The amount of sugar in a liver taken without any special precautions to ensure rapidity of manipulation is considerable; that which is present in a liver removed with rapidity immediately after death and at once plunged in a freezing mixture, and thus reduced to a temperature which would suspend both vital and ferment action, is small. The saccharine condition of the liver taken after death by ordinary methods is thus seen to be due to a *post-mortem* change. The fact that in liver substance treated with alcohol, dried and powdered, a comparable production of sugar can take place under suitable conditions of moisture and temperature is a proof that the change is due not to a vital, but to ferment action, a conclusion which considerations drawn from the nature of the chemical change rendered probable *a priori.—British Med. Journal.*

◆

THE RELATION OF GASTRIC ACIDITY TO ACIDITY OF THE URINE.

ALBERT MATHIEU and CH. TREHEUX.

RESEARCHES made by the authors upon the connection between gastric acidity and urinary acidity in the course of normal digestion and that of dyspeptics lead them to the following conclusion :

1. There is a connection between the acidity of the gastric juice and the acidity of the urine.

2. The more acid there is produced in the stomach, whether by secretion or by alimentary fermentation, especially gastric fermentation, the greater the proportion and the quantities of acid eliminated by the urine during the period of digestion.

3. In the normal state the acidity of the urine is notably lowered during the three to five hours following the ingestion of food. After that it rises. The lowering of the acidity may be preceded by a slight increase during the first hour, as if a certain quantity of acid were immediately hurried away by the wave of ingested liquid and rapidly eliminated.

4. In most cases there is an almost absolute parallelism between the curves representing the relative acidity and the absolute quantity of acid excreted This parallelism is, however, destroyed when there is a certain degree of polyuria following a meal. The curve of relative acidity then rises while that of absolute acidity is lowered.

5. When a considerable quantity of the acid of secretion is removed from the stomach, either by vomiting, or by lavage, there is produced a marked lowering of the acidity of the urine, which may, under these conditions, even become alkaline.

6. The mean quantity of acid eliminated per hour is higher in *hyper*chlorhydrics than than in *hypo*chlorhydrics.

7. The ingestion of milk causes a notable increase in the quantity of acid excreted in the urine. This is doubtless due to the fact that milk rapidly produces a large quantity of lactic acid in the stomach and that this acid is swept to the kidneys by the increased diuresis, produced by the ingestion of liquid.

8. Milk should be excluded from the test-meals used in researches upon this subject. The meals should be the same for all patients.

9. The patients under observation should be submitted to a regimen for a sufficiently long time. The ingestion of beer, for example, in the evening, will notably increase the acidity of the urine during the following day.—(*Arch. de Med.* 1895, p. 526.)

CLEANSE THE ALIMENTARY CANAL.

WITH the advent of hot weather the occurrence of diarrheal affections both in adults and children is becoming frequent. Not only in domestic practice, but by some physicians, the mistake is made of attempting at once to check the intestinal flux by means of opium and astringents. The result of this, if successful, is to imprison within the bowel toxic and irritating materials that keep up the disorder, and if unsuccessful in checking the flow the patient is more or less depressed by the narcotic drug, in addition to the intoxication resulting from absorption of intestinal poisons. No matter whether the case be seen late or early the first indication is to clear the alimentary tract. For this purpose a high enema may be used, calomel given in small doses frequently repeated or in one or two larger doses, or, as we prefer, castor oil and aromatic syrup of rhubarb may be given together in equal parts, namely, about a teaspoonful of each for a child, a tablespoonful of each for an adult. After this has secured the removal of the offending materials from the bowel, intestinal disinfection by means of salol, salophen, benzoyl guaiacol or guaiacol carbonate, benzo-naphtol, creosote, or whatever other drug the physician prefers for this purpose, is in order. The diet must be restricted to small quantities of non-fermentable food, preferably liquid. Pancreatized, sterile milk usually answers the purpose for adults. With children, on the other hand, it is well to avoid milk, and beef juice freshly prepared at home by expression from a piece of warmed meat, or preferably, in some cases, barley water, is to be substituted during two or three days. When pain is severe and there is a tendency to continuance of a watery discharge from the bowel after all irritating matters have been removed (and to make sure of this a high enema should be given), Dover's powder or other appropriate preparation of opium may be employed with due caution, both in the case of children and in the case of adults. In cases in which pain and tenderness are localized in the region of the cecum, appendicitis is nowadays often improperly diagnosticated. It is true that in very many cases the cecum and appendix share in a general catarrhal process. In such cases it is well to place an ice-bag over the cecal region until the pain and tenderness subside. An important diagnostic point is the presence or absence of rigidity of the abdominal muscles upon the right side. In the absence of such rigidity or "on-guard" condition, as it is now termed, acute appendicitis should never be diagnosticated unless a collection of pus is palpably to be demonstrated.—*The Philadelphia Polyclinic.*

◆

PHTHISIS AMONG THE INSANE.

IN THE April issue of the *State Hospital Bulletin* we find a very interesting article by Dr. George Allen, of the Middletown State Hospital, showing that with proper care the percentage of deaths in insane hospitals need not be greater than in private houses. Dr. Allen quotes from Dr. Babcock's article in the "Transactions of the American Psychological Association," that tuberculosis is two or three times as common in institutions as in the general population, and that the prevalence of the disease may be regarded as a test of the sanitary condition of the hospitals. In the City of Middletown, where the hospital is situated, there were in 1890 in each 1,000 deaths, 102 from consumption, while in the hospital, during the same period, there were only thirty-three to each 1,000 deaths. To secure these results, not only the wards, but the entire buildings, have been made as antiseptic as possible. The basement is from time to time sprayed with some antiseptic solution, and the floors of the wards washed with hot water and carbolic soap. The floors dry speedily, and bacillus from dried sputa are effectually removed. Milk is used in abundance, and generally given hot. Thorough ventilation of the wards, the utmost cleanliness of the person, and rest in the incipient stages of bronchial troubles, are great factors in keeping up the vitality necessary to resist acute troubles. Consumptive patients are isolated as much as possible, and the walls of the room, in cases of death, are rendered thoroughly antiseptic. It is evident from the facts stated by Dr. Allen, that, with proper sanitary regulations, there is no more danger from phthisis in a general hospital for the insane than in private houses, and possibly even less, from the fact that in private houses there is generally less attention given to antisepsis than in public institutions, where all the officers are supposed to be fully versed in the most advanced ideas of hygiene.—*Medical Times.*

THE ANNUAL VACATION.

AT THIS season of the year the physician is frequently consulted concerning the choice of a climate or location suitable for the temporary residence of his patients. The annual vacation has now become a permanent institution in our modern life. Whether it be the week or ten days respite of the wage-earner, or the longer period extending often into months, in the case of persons of more fortunate circumstances, the summer vacation is usually designed to afford rest and recreation to the weary or renewed health and vigor to the invalid. In the choice of a climate for either class that location which affords the best results in the shortest time is the one to be selected.

The climate of the ocean varies less in temperature, not only during a single day, but from season to season, for reasons which are well understood. The humidity of sea air is also considerably greater than that of an inland situation, irrespective of altitude. The loss of body heat is greater on the sea than on land; the excretion of urea and sulphuric acid in the urine is increased, while the uric and phosphoric acids diminish, and the weight of the body increases. Beneke has demonstrated that these results are due more to the sea air than to sea bathing. On account of the great humidity and the high atmospheric pressure the rates of the pulse and respiration are lowered; sleep is more refreshing and the appetite is increased, the general effect of a marine atmosphere upon suitable cases being that of a sedative tonic.

Cases which are most likely to be benefited by a sojourn by the sea are those of people who suffer from nervous irritability, or even those manifesting organic nervous changes. Cases of cardiac disease are generally benefited and persons with hepatic and renal disorders usually improve. Other pathological conditions which are favorably influenced by ocean residence are the lithic diathesis, rheumatism and gout; for as shown above, metabolism is markedly increased, excrementitious substances are more rapidly eliminated, and the general health improves proportionately. Infants and old people should be sent to the sea shore in preference to any other climate.

In elevated climates the air contains so little moisture that its temperature is very slightly elevated by the sun's rays, so that while the direct sunshine may be very hot, the air is cool. The air is rarer and its humidity is much less in elevated climates than at the sea level.

The action of the skin is increased, and at first the rates of the pulse and respiration are increased, but gradually return to the normal, with increased strength of the heart muscle and the muscles of respiration; sleep is generally improved and the appetite increased.

Cases which are most likely to be benefited by an elevated climate are those of anemia and chlorosis, pharyngeal, laryngeal and bronchial catarrh, asthma, phthisis. As a general rule, cases of marked organic heart disease, atheroma, vesicular emphysema and epilepsy do not improve in high altitudes.

Other points to be considered in selecting the place of sojourn for our patients are ease of access, sanitary conditions, including drainage, water and food supply, etc.

The summer vacation is a useful and excellent institution if wisely planned and well spent; and even the busy physician, whose whole thought is for the welfare of others, should lay aside his cares and duties for a brief period in order to recover at least a portion of the nervous vitality which the practice of medicine consumes as a flame, for physicians as a class are notoriously short lived.—*Codex Medicus.*

TUBERCULOSIS.

THE controversy over the etiology of tuberculosis, which has been so much in evidence since the discovery of tubercle bacillus by Koch, has now given way to the more practical one concerning its prevention and cure. That tuberculosis is an infectious disease no one can doubt who has once observed the direct positive results obtained by inoculation with tuberculous sputum, and dust or milk known to be infected with the bacilli into the guinea pig or rabbit. The wide-spread prevalence of the disease in the human race (one in eight of all deaths being caused by tuberculosis of some form) demonstrates clearly how often man falls a victim to this dread scourge. Appalling as such a statement is when one considers it due to an infectious disease, yet the fact should not be lost sight of that there are qualifying conditions which are of most vital importance in the growth and development of the disease. The ubiquitous tubercle bacillus, as with many other germs, often finds lodgment in man by inhalation, or the ingestion, of tuberculous milk or meat, but it falls on barren soil and is quickly rendered harmless. Why is this? Because the resisting powers of the individual are capable of destroying the invading host. These resisting powers are exemplified by the man as seen in perfect health, whose organs all perform their functions perfectly and in whom cellula activity is in its most perfect state. Contrariwise, when man's vitality is lowered by any inherited constitutional weakness, malnutrition whether due to disease or insufficient food, bad hygienic surroundings, physical or mental depression from over-work or abuse of the appetites and passions, his resisting powers fall way below par, and there then exists the inherited or acquired pre-disposition to the disease. The congenital transmission of the disease from parent to off-spring has been proven, but it is the exception which proves the rule; and it is this knowledge that a pre-disposition to the disease and not the disease itself is the child's inheritance which offers us such promising results in diminishing the prevalence of and the possible ultimate eradication of this dreaded enemy of mankind.

To attain this end must be a slow process unless some brilliant mind discovers unexpectedly the means of producing an artificial immunity against the disease, as Jenner did for small-pox, and Behring and Roux for diphtheria. While scientific men are working along this line much good can be done by disseminating the knowledge of the sources of infection and how to avoid them. For all practical purposes the sources are three-fold, viz., the sputa, stools and pus from ulcerating lesions; second, the milk supply; and third, tuberculous meat; these are in the order of their frequency. Personal contact with a tuberculous patient is not attended with any danger if the discharges are always kept moist, for it has been proven beyond cavil that the expired air of consumptives does not contain tubercle bacilli. The danger lies in the dried sputa and other excreta; these are the sources of infection, and every physician should emphasize with his patients the necessity of destroying them, preferably by fire; if this is impractical, always keep them in a moist condition until they are deposited in some place where they can do no harm.

Concerning the milk there is cumulative evidence in abundance to show that milk supplied in any one of the larger cities is frequently contaminated with tubercle bacilli; inasmuch as this constitutes the chief form of nourishment for children, and in them glandular and intestinal tuberculosis predominates, the urgent need of eliminating this source of infection is apparent to physician and layman alike. Koch's tuberculin supplies us with the means of eliminating bovine tuberculosis; and although legislation in New York and Massachusetts has failed in accomplishing what the people demanded, it is a step in the right direction, and ultimately it is more than probable that laws will be enacted compelling all dairy cattle to be subjected to the tuberculin test. The Boards of Health have it in their power to do much towards hastening the actions of the Legislature, and in New York City and Alleghany, and other places have already enacted new regulations and begun the more rigid enforcement of old ones concerning the care and attention of dairy cattle. With their power and scientific intelligence in the van it will not be long before the opponents of this much needed reform will be routed.

The exclusion of tuberculous meat would be more easily brought about if tuberculous cattle were excluded from dairy herds, whatever animals thus escaped detection would have to be passed upon by the public inspectors of the meats, thus there would be small chance of such contaminated meat being offered for sale. Reforms are always difficult to bring about, especially so when tradition and ignorance are opposed to them. Tradition serves to strengthen the prevailing idea among the unenlightened that inheritance is the most important factor in the development of consumption, when ignorance of what is the distinct cause is added to this carelessness about the disposition of the sputum, etc., is the natural consequence and a wide-spread dissemination of the infectious material results.—*Charlotte Medical Journal.*

◆

OLEOMARGARINE AND THE FEEDING OF FAT.*

THE problem of nourishment in wasting diseases is perennial. In most instances the balance between waste and repair is greatly to the credit account of the former, despite all the resources of the medical art, direct or indirect, and whether adopted with a view to increasing nourishment or limiting elimination. Not the least of the difficulties that confront the practitioner is that of securing the full co-operation of the patient, for in sufferers of this class Hope is constantly present, along with more or less disbelief in the conclusions drawn by the medical attendant. It is rare to find a consumptive who believes his vitality is already sapped or his life seriously in danger; and such a patient will insist upon yielding to the caprices of appetite, and upon assuming that he has plenty of time before him in which to decide regarding measures that, though vital, seem to him at the moment wearying or obnoxious.

With the first introduction of cod-liver oil it was believed that the problem of nourishment in wasting diseases was solved; and this agent to-day continues to be the favorite, under the supposition that it offers the greatest possible results both to prescriber and patient, with a minimum of objectionable features. But there is nothing magical about this oil; save as an easily digested form of fat it is valueless, notwithstanding the many preparations of the so-called derivatives, active principles, glucosides, etc., which are offered to delude practitioner and patient, and which after all are only the ptomaines of decomposition. Again, cod-liver oil is by no means the best form of fat, as has been shown on various occasions by Fothergill and others. There are few instances where the digestive organs will tolerate for any prolonged period a diet of this or any other unpleasant or pronouncedly flavored fat, despite the various attempts of the art to make them palatable. Indeed, nowhere is the truism of "one man's meat" being "another's poison" more apparent than when one assumes the management of wasting disease.—And it may be mentioned here that mineral oils which are sometimes recommended as substitutes are utterly devoid of even the semblance of nutritious properties, while vegetable fats generally are very inferior to those derived from animal sources.

Fothergill expresses a most sensible preference for natural food fats—butter, fat pork, suet, etc.; and the benefit that consumptives often derive from winter residences in lumber camps is not due so much to the boasted balsamic air as to the capacity that is thereby developed for consuming and digesting enormous quantities of hydrocarbons. This fact is often lost sight of by medical men who counsel their consumptive patients to spend their winters in the mild or enervating climate of the tropics or subtropics.

---

*Scientific American.

In every-day life, butter is very essential; it is not regarded with the loathing that accrues to an article of food that is popularly classed among medicaments, and consequently its free use by sufferers from wasting diseases is to be encouraged to the utmost in so far as it can be borne. All this seems very simple, but unfortunately an excess of butter diet even in a healthy organism is apt to give rise to butyric dyspepsia, with so-called "water-brash ," "pyrosis," "heart-burn," etc.; and butyric fermentation is set up largely through the presence of a ferment —a residuum left by the buttermilk—which should theoretically be absent, but which in practice it is impossible wholly to eradicate. This latent (lactic) ferment is the cause of decomposition—frowsiness, etc.—in butter, and thus renders the product of the best dairies deficient, from a digestive standpoint. Excessive washing, moulding and mixing is always an injury to butter, inasmuch as it results in disarrangement of the relations and proportions between oleic and margaric acids, and often— as with creamery products—gives a salve-like appearance and consistency not at all conducive to appetite.

Considering the foregoing, it seems strange that oleomargarine has not been thought of as a palatable and suitable article of diet for those suffering from wasting diseases. It is free from all objections, despite the idle and malicious tales industriously spread by parties interested in securing high prices for inferior and unwholesome dairy products—were the truth fully realized by all classes, bad butter would have no market; but unfortunately the majority of the people have no comprehensive idea as to what oleomargarine is.

Méige-Mouries, the official chemist under the late French Empire, with a view of giving the poor and sea-faring people an article that would be wholesome, nutritious, cheap and at the same time capable of being kept for unlimited periods of time, while working at the Imperial farm at Vincennes sought to imitate the progress supposed to take place in the bovine economy when cows are under-fed and the butter furnished is derived from their own fat. The process he invented is practically the same as that employed to-day

First, the very best quanity of *fresh* suet, finely comminuted, is placed in a steam-heated tank along with a small amount of bicarbonate of potash and the stomachs of sheep or pigs, and retained at a temperature of 132° F. for two hours or more, or until the stomachs have succeeded in dissolving the fat membranes, and the fat itself has risen to the top:

Second, the fat is drawn into another tank and two per cent. of salt added, while it is maintained at a slightly higher temperature; and after a short time the fat becomes clear, takes on a yellow color, and presents both the taste and odor of fresh butter:

Third, the fat is again drawn off, and after cooling is cut in pieces, wrapped in linen, and placed in a hydraulic press at a temperature of 177° F. whereby it is separated into two portions— stearine and olemargarine. The former goes to the candle-makers; the latter is artificial butter theoretically and chemically. Of course, different manufacturers vary the process according to individual ideas and needs, and some use pepsin direct instead of obtaining it through the medium of animal stomachs; nevertheless the principle is the same on all occasions.

The resulting product, as a matter of fact, is a better and purer butter than nine-tenths of the dairy product that is marketed, and one that is far more easily preserved. No one, however expert, can detect the difference between "oleo" and the best dairy butter, except, perhaps, after a long diet of the former he may suspect the latter, owing to the faint acid flavor due to the lactic ferment that properly should have been removed. To be sure, every one imagines it possible to distinguish "oleo" from dairy butter by taste alone, but in truth differentiation is very hard to accomplish by any process, even by the expert chemist with all the most elaborate laboratory means at his disposal.

There are a large number also who imagine oleomargarine is made from any old scraps of grease, regardless of age or cleanness—which is quite the reverse of the fact; indeed, a good "oleo" can only be had by employing the very best and freshest of fat. This "artificial butter" is as purely wholesome (and perhaps even better as food) as the best dairy or creamery product. Some, while the "oleo" is fluid and at high temperature, with a view to inproving flavor, add milk, water, and salad oil. In any event it is imperative upon the manufacturer that the greatest hygienic precautions be constantly employed. Consequently artificial butter, or "oleo" is not only, as just remarked, equal to genuine butter in flavor and fully as nutritious, but greatly superior to the latter in being freed from lactic acid, whereby it is less liable to become rancid and form a harboring place for bacteria. Recently Jollies and Winkler, who are the official chemists for the Austrian Government, after a very thorough investigation, announced through the columns of the *Zeitschrift fuer Hygiene* that the only germs ever present in "oleo" are the varieties common to air and water; although carefully sought for, tubercle and other obnoxious bacilli were conspiciously absent. They also found that the dairy product is especially liable to be contaminated, inasmuch as the best process of manufacture fails to eliminate all the lactic-acid ferment, the action of which even salt cannot neutralize save for a very brief period.

It may here be added that the greatest producers of "oleo" are also the greatest individual consumers thereof, for the reason—as one expressed himself to the writer—they "know what it is being eaten, and have the assurance that it is always thoroughly clean"—an assurance that can never be depended upon regarding any dairy product.

"Dairy butterine," so-called, is only the attractive title given to an "oleo" put up neatly in rolls in a gauze envelope. There is, however, a cheap product denominated "butterine," sold at a much lower rate than true "oleo," which is merely a mixture of the latter and neutral lard; even this, if made from strictly fresh material, is not necessarily objectionable. Those products denominated oleomargarine, butterine, etc., which are of rank character, do not emanate from reputable factories, which are invariably connected with beef-packing houses, but from petty manufacturers who accept fats of all kinds that are rejected by the regular oleomargarine-makers. The very fact that an "oleo" offered is devoid of unpleasant odor or flavor is evidence sufficient that it is a genuine article and made only of the freshest and purest fat. Another thing regarding "oleo" is that from the time the fat is placed in the melting-vat until it is laid before the consumer as an artificial butter—the adjective "artificial" is certainly superfluous, from a chemical standpoint at least—the entire process is one of the greatest cleanliness, and the product is never by any means allowed to have the taint of human hands, and for market purposes is further protected by an envelope. Finally, it may be added a large proportion of the material at the present time marketed as pure butter, and, emanating from country dairies and creameries, is but mixture of cheap "oleo" and dairy butter.

It is surprising the amount of fat that a consumptive finds it possible to consume when employing "oleo" instead of butter, and it is by no means essential that the individual shall be informed that the product of the packing-house is not derived from the dairy if he is likely to have any prejudices in this respect.

Department of Physical Education,

WITH SPECIAL REGARD TO THE SYMMETRICAL DEVELOPMENT OF THE BODY.

Edited by J. Clark Slay, M.D.

WALKING AS AN EXERCISE.

All forms of exercise should be regular. It is a very great mistake to suppose that occasional efforts will repair any part of the mischief which habitual indolence produces. A celebrated physician has said that the weak and valetudinary ought to view regular exercise as one of their moral duties. It should be so, in fact, with all. There is no one, not actually laboring under disease, who should not consider it a duty to appropriate a certain portion of every day to active exercise in the open air. It would be important, also, could this exercise be connected with some pleasing occupation or pursuit. The mere movement of the limbs, as a stated task, will have a far less beneficial effect upon the health of the system than if the mind be at the same time pleasurably but not too intensely occupied. Hence, to those who are able to command the time and means, botanical pursuits, mechanical occupations, the cultivation of a garden, or any innocent recreation will be a means of increasing very considerably the salutary effects of bodily exercise.

No kind of exercise should be carried so far as to produce undue fatigue. All extremes are injurious to the system, and over-exertion is not less capable of producing bad effects, though of a different kind, than constant inactivity.

Exercise should not be entered upon immediately after meals, as it is liable to interfere with normal digestion, particularly in the nervous and irritable, and give rise to disagreeable sensations in the stomach. The instinct of the lower animals confirms the propriety of this rule, for they all indulge themselves in rest after taking food. Whenever it is possible, therefore, exercise should be delayed for one or two hours after meals. The objection may here be raised that we often observe laborers return to work immediately after partaking a heavy meal, without any apparent inconvenience. While we admit this fact, we would warn those who would follow the practice to be certain first that they possess the laborer's vigorous body and powers of digestion, and imitate in other respects his regularity of life. But, after all, do we not observe these very laboring men leave their tables with reluctance, and work with less activity and cheerfulness for some time than they did before eating? The necessity for rest after dinner, however, seems to be pretty well established among the laboring classes, also. An hour for rest, with an occasional nap, is very generally observed.

Exercise has been divided into active and passive. The first includes walking, running, leaping, dancing, gardening and the various mechanical occupations, while the latter comprehends sailing, swinging, massage, carriage and horse-back riding. The last of these, however, is of a mixed nature, and is, in some respects, active as well as passive. Walking is, undoubtedly, one of the most natural, gentle and beneficial of the active species of exercise. It is within the power of every individual, having the free use of his limbs, to practice, and no one can have any valid excuse for neglecting it.

In walking, it is all important that the body should be held as near the upright position as possible, with the shoulders thrown back and the breast projected forward so as to give to the chest its full dimensions. The lungs, in this position, are allowed sufficient room to expand fully, breathing is rendered free and easy and the function is performed with regularity and vigor. The attitude thus assumed in walking places, in fact, all the organs of the body in their most natural position and frees them from all constraint. Frequent brisk walks with these precautions is one of the most effectual antidotes to those injuries so liable to result from the bent and fixed positions assumed by persons of sedentary pursuits, whether student, artist or mechanic. Women, likewise, would do well to devote some hours out of the twenty-four to walking exercise. In the more opulent classes of society, in particular, they are very apt to fall into an unpardonable neglect of this important means of preserving health.

Brisk walking in the erect position at regular intervals, in the open air, tends to equalize the circulation, facilitate digestion, secretion and elimination, and thus strongly aids in the preservation or restoration of the correct performance of every function of the body.

THE THERAPEUTIC VALUE OF EXERCISE.*

By Randolph Faries, M.D.

Director of Physical Education in the University of Pennsylvania,
Philadelphia.

Therapeutics is the most essential branch of medicine, because it treats on the application of remedies and the curative treatment of diseases. There is not a single physician who will deny that exercise exerts a tremendous power over the body; and its therapeutic value in a great many diseases is equal to if not greater than that of drugs. When scientifically prescribed,—and by scientifically I mean from a medicinal standpoint,—it is capable of producing results which are of inestimable value to the patient. On the other hand, if prescribed empirically, the results may be such that a shattered and maimed condition of the physique will remain ever after, and in extreme cases death may follow. The advantage the physician possesses, in prescribing exercise as a remedial agent for his patient instead of a drug, is that he is using a natural means which is physiologic in its character to overcome the diatheses of the body and cure the diseases of it; while if he were to employ drugs he would be using an unnatural force and one usually employed to change pathologic conditions to those of a physiologic or natural state. The potency of exercise is measured not simply by prescribing it, but by prescribing it intelligently,—that is, by using it when needed and adding to it any auxiliary means, such as drugs, pure air, proper and nutritious food, suitable clothing, bathing, water, either mineral or pure in its nature, ventilation, and sunlight. When prescribing exercise the doctor should consider heredity, idiosyncrasies, age, sex, strength of constitution, previous diseases, and injuries; also habits and temperament, and should add to these everything which pertains to bodily hygiene. Few persons know the symptoms of exercise when it is doing good, and still fewer recognize the symptoms which are the prodromes to overwork and exhaustion, whereafter disease frequently follows. The symptoms of exercise, when correctly applied, will be increase of appetite, increase in bodily weight (training and persons with a great amount or adipose tissue excepted), bright color of skin, the heart-beats are regular and full, there is an increase in pulmonary capacity, the normal sounds will be clear and distinct, the muscles contract more readily and become harder, will-power is strengthened if the exercise be a voluntary one, the nerves respond to stimuli more quickly, the different parts of the body assimilate food more readily, accomplishing bodily construction with little or no waste of energy, sleep is of the soundest and most refreshing kind, and the cornea will present a glassy, bright appearance. If the exercise prescribed be doing harm, the symptoms will be just the opposite of those when good is resulting, and we find the appetite impaired or lost, bodily weight is decreased, the skin blanched or pale, the cardiac impulse is diminished in force and may be irregular, hypertrophy with dilatation and even valvular disease may follow, the pulmonary air-cells become very much distended, if the exercise be one that has called upon the lungs to any great extent, a slight vesicular murmur can be heard upon auscultation, and if the exercise has been one calling for repeated strain one will hear a slight bronchial râle, the lungs may become emphysematous which may lead to phthisis, the muscles do not contract quickly nor to their fullest extent, they become flabby and have a doughy feel, a disinclination to work comes on, which diminishes will-power, disposition will become irritable, the nerves respond to stimuli less quickly, food is badly assimilated throughout the body, sleep is supplanted by restlessness and wakefulness, and the cornea has a dull appearance.

---

*Annals of Hygiene.

Many physicians prescribe exercise, never dreaming that they are already adding coals to the fire of the disease for which they prescribed it. For example, one physician will tell a patient who is suffering from brain overwork to take riding lessons, forgetting that mental operations are required to learn to sit properly and guide the animal at first; another will advise bicycle-riding which also requires mental effort. From this we learn that no voluntary movement should be prescribed for a person suffering with mental trouble, and, in fact, one may be compelled from the strength of constitution of the patient to begin his or her treatment by first insisting upon a rest in bed.

There is nothing which will add to the usefulness of a life and be so great a protection from disease as exercise properly indulged in. By what mechanism does exercise manifest its value as a therapeutic agent? By bringing into play the organs of movement,—namely the brain, spinal cord, the nerves and muscles, which stimulate every part of the human frame by sending new blood to the different parts of the body and carrying old away. Let us analyze the therapeutic value of exercise in reference to brain overwork brought about by study, over-anxiety, and the many moral responsibilities one constantly encounters. When the intellectual organs are taxed for a long period the brain is kept active, nervous changes are manifesting themselves with lightening-like rapidity, in the brain-cells, waste products, especially urates and uric acid, are produced, combustion increases the cerebral temperature by sending more blood to the part, the strain upon the nervous mass gradually but surely becomes too great and nervous exhaustions of all sorts follow, and alas, when it is too late, insanity overtakes the student.

Prescribe an involuntary exercise and what will be the result? The blood will be drawn from the brain to the part employed because wherever there is movement there we shall find the blood flowing in greater quantities; and in this way we deplete the overcharged blood-vessels in the cerebral mass, and in so doing have decreased the temperature of the brain; further, we have changed the place of the production of waste materials, and in this way have rid the brain of being exposed to their toxic effects, moreover the life and death, or production and destruction, of the brain-cells have been diminished, on account of a smaller amount of blood going to the brain and no cerebral energy is expended because the exercise is automatic and calls for no stimulation of the will. The additional point gained, as to the therapeutic value of an involuntary exercise, is that we have eliminated the action of the brain and have thus conserved just so much nervous energy, because the spinal cord takes the place of the brain and the blood goes to this part of the nervous system in greater quantities instead of going to the brain.

Take another use of exercise and apply it to the brain where we find a need for it by stimulating the motor centres through the will in cases of infantile palsies, so that we may get the child to endeavor to use its limbs and frequently we overcome this disease, in a great measure, by using exercise in conjunction with different kinds of apparatus. If the surgeon would not give up in despair, in reference to these cases, but endeavor by one means or another to get the child to use its will-power I am sure more numerous and more satisfactory would be the results. The difficulty often lies in the fact that the child is not shown how to make the best use of the amount of movement she or he has. More attention should be paid to developing the child's will-power to work in harmony with the organs of movement and especially the muscles, instead of allowing it to have its own way and rebel against doing anything which will cause it to exert all the energy it has to move the affected parts; by so doing I am sure the child would learn to use the affected part with a great deal of advantage.

Nervous maladies are found everywhere, and the evil results are too well-known by the physician to need any discussion. Could the myriads of men and women who suffer with nervous diseases only know the therapeutic value of exercise they would exercise enough to bring their shattered bodies back to a state of good health, and would not drag through their daily work and care eagerly waiting for bedtime to arrive. Some will say I have exercised and it has done me no good. Alas! it is too true; but why? Because no medicinal examination has been sought, no advice from a physician has been asked for, no laws of bodily hygiene have been followed, nothing but spasmodic work has been taken, and in nine cases out of ten the exercise has been taken too violently, too soon after eating, and under the guidance of an empiricist, or, still worse, under no guidance at all.

The therapeutic value of exercise also holds a high place in the public hygiene of our land. Constantly great changes are being made in the study of medicine, changes which are for the better and which are of priceless value to our nation, everywhere sound judgment is beginning to assert itself, and the question of exercise is now recognized as holding a most important therapeutic value throughout our land. The leading educators have been convinced of the value of exercise when therapeutically applied, and have given it its proper place in the curriculum in the institutions with which they are connected.

Dr. S. Weir Mitchell, in his excellent little work,[1] shows conclusively how greatly exercise influences bodily change, and says: "Above all, educational wants are limited in kind and degree, and the physical man, woman, and child are what the growing state most needs. This is because nature must have a good foundation to start with, or man's mental, moral, spiritual, physical, and social being will be as naught. If you give nature but half a chance and apply exercise judiciously to her needs, she will with little trouble and without detriment so adjust springs of action that a most healthful physique will follow. On the other hand, if you apply exercise wrongly to nature, her laws will remain the same, and, instead of being able to change her laws, one will find that the laws change the person who tries to take exercise by burning the candle at both ends, and trouble will positively ensue which will leave the body weakened forever."

Exercise modifies every tissue in our bodies, and the result of the modification will be for good or evil according to the judiciousness or injudiciousness with which we apply it. It has long been known by physiologists that function makes the structure of every organ and tissue we possess, which is simply saying that the body adjusts itself, or the different parts which control it, by applying movements to its different parts. The integrity of an organ or tissue depends upon the persistence of function, and it is through this persistence that we see muscles kept strong and healthy, the internal organs undergoing changes, joints modified and becoming easily moved, ever changing in structure, and the brain strengthening, enlarging, and modifying its convolutions. If muscular tissue be allowed to remain in a state of repose too long, we find its fibres weakened because they become clogged up with fat and other materials, the muscle will atrophy, and this influence will be felt by adjoining muscles. Besides this, we find the joints are affected and their movements are retarded, because they are absolutely dependent upon muscular action, and in extreme cases where there is a want of action the bones become ankylosed—in other words, they are ossified, and an immovable articulation is the result. Is not the therapeutic value of exercise beyond measure in such cases when we know that a joint may regain its function and the mobility of it be re-established by using it either actively or passively? Surely no one will deny this value.

---

[1] Wear and Tear, or Hints for the Overworked, p. 9.

Further, let us see what exercise does for the heart and lungs. One must understand what the heart is and what the lungs are before being able to realize what a powerful effect exercise has upon them. Suffice it to say that the heart is a muscle and the lungs are the organs of respiration, composed chiefly of elastic tissue, and may be compared to a pair of bellows. Exercise enlarges the muscular fibres of the heart, makes them more elastic, they become firmer and stronger, and it is owing to this change that the blood is driven more energetically through the blood-vessels to the different parts of our body. A strong heart has an especial influence over our lungs, because it sends the blood with greater force to the pulmonary capillaries, and relieves us more quickly of breathlessness by modifying the passive pulmonary congestion, which is a concomitant of certain exercises. The lungs are benefited by exercise by having their air-cells brought into action, causing them to expand and thus increase in size and strength.

Further, the functional changes which occur during exercise, when scientifically applied, must be regulated by the nervous system, which is the agent that governs every organic function in our whole body. Should there be any disturbance in the nervous system, we immediately find the various organs suffering as to their function —*e. g.*, the slightest injuries to the nerves, spinal cord, or brain will produce contractions, convulsions, atrophies, and paralyses of muscles; the different glands will be affected, and the heart and lungs will also suffer. It may be inferred that the whole nervous system may be strengthened by exercise, just as muscles are; by this I mean the number of cells in the brain and spinal cord may be enlarged by exercise, and the nerve fibres themselves may also be enlarged in just the same way that muscular fibres are. What the limit of increase may be is not known, but it is reasonable to believe that these structures are enlarged, because we know that persons increase as to their will-power, and this is undoubtedly due to the nervous vibration taking place in the cerebral cells, produced by different kinds of stimuli.

Moreover, Dr. Luys, in his work on "The Brain," has proved that, after a limb had lost its function, certain parts of the gray matter underwent atrophy, which was due to defective action of the motor cells; hence, if such an action can cause a want of development in these cells, it is but fair to conclude that exercise can increase the size and development of these cells, and since the brain is directly connected with the spinal cord and the spinal cord with the nerves, it is fair to infer that the same development would take place in these tissues. It is a well-established fact that the convolutions of the brain are developed by men who use their arms and legs to a great extent. We also know in idiots the convolutions are very poorly developed, and in some instances they are nearly smooth; while, on the other hand, the brains of men who in life were on an intellectual plane much above the average of their fellow-men, show convolutions of a most emphatic character. These conclusions point decidedly to the fact that will-power may be strengthened by exercise, because the person who is capable of undergoing systematic exercise puts himself or herself through a discipline which constantly requires volition to come into play, and the very habituation to work produces greater energy of will power, which is productive of a moral as well as a physical force in the nature of the person exercising; and not infrequently the moral force thus produced changes a man from an immoral to a moral being, because it is through his exercise that he has developed the qualities of precision, perseverance, courage, decision, forethought, self-control, patience, endurance, unselfishness, and many other qualities. Again, we not infrequently find persons whose very soul engages in the exercise they indulge in, and this appeals to their spiritual nature. Hence it is but fair to conclude that exercise has a spiritual influence upon mankind. So often do we find persons averse to taking exercise, because they are thoroughly conversant with all its abuses, while they are totally ignorant of its uses. They have heard of one person dying from consumption brought about by exercise, another from heart disease from the same cause, a third from ruptures of various parts, a fourth from too long a walk, and so on; and they are right in their belief—that is, the trouble was started by exercise, but in how many cases did the person seek the advice of a physician at the outset? Not one, I venture to say.

The therapeutic value of exercise exerts a great influence upon cell-life, and we find thousands upon thousands of cells of all kinds produced and destroyed by exercise. Exercise not only increases cell-production, as I have already alluded to, but it also gives greater vitality to every cell in our bodies when scientifically applied. Protoplasm is cleansed and recleansed, produced and reproduced, by exercise, by being purified while in the blood, and hence a better tissue results, no matter whether it be nervous, muscular, elastic, or osseous; and especially so when everything pertaining to bodily hygiene is added. Moreover, more bodily energy is acquired, and it is also of a more lasting nature when exercise has been used properly, instead of being abused as it is in many cases. The metabolic changes which are brought about by exercise are the very conditions which sustain the equilibrium throughout our bodies. The selective power of the cell is made more manifest according to the integrity of the mass of protoplasm supplying it. Anything that interferes with, injures, or alters the blood-current will change the normal relations between the flow of blood and the tissues supplied, and here we find metabolic changes concerned, because they depend upon blood-supply and tissue change. If we use exercise judiciously we may by it bring a perverted tissue back to the normal and re-establish a function which seemed to all intents and purposes lost, and if not lost at least greatly impaired. Metabolic changes are affected in many ways—*e.g.*, by a general atonic condition of the vasomotor system, atheroma of blood-vessels, a paretic state of the trophic nerves, a feeble condition of the heart and by a lack of exercise itself. If we apply exercise to the foregoing condition we may so tone up the system that the existing trouble will disappear, or at least be so greatly benefited that no evil result will follow, which would have followed had exercise been omitted.

It has long been known that anæmia and leucocythæmia are characterized by changes in the blood, which are traceable to a disordered metabolism, and these diseases may be greatly benefited by exercise, especially if nutritious food, attention to hygiene, and some of the preparations of iron be added. Gout, rheumatism, Bright's disease, consumption, heart diseases of all kinds, all kinds of deformities due to muscular action, such as lordosis, scoliosis, talipes, calcaneus, talipes equino-valgus, talipes varus, talipes equinus, talipes valgus, hollow chests, round shoulders, drooping shoulders, a condition where one carries the head forward and downward, feeble-minded children, hepatic and gastro-intestinal troubles may be treated by exercise. The value of exercise in gout and rheumatism manifests itself by driving the blood to every part of the body, and in this way all the tissues which are contaminated with an excess of urates and uric acid are bathed with new blood which carries these waste materials to the kidneys for elimination from the body. In Bright's disease the kidneys themselves may receive such a thorough washing by the blood that the patient may receive no end of benefit; but great care should be taken in prescribing exercise for one suffering with this malady, lest too great an action should be called for by the kidneys in the elimination of waste products.

Exercise for consumptives may be either active or passive. When it is active—that is, if the patient indulges in it himself—he should always do so under the direction of a physician so that the disease may be benefited instead of aggravated. If passive—that is, by the treatment of massage—it should be borne in mind that too much rubbing and too long a *seance* will often be more productive of harm than of good. The course a person suffering with weak lungs should pursue, if engaging in active exercise, should consist of breathing exercises which are productive of long inhalations and exhalations, movements of all kinds should be indulged in, but these should always keep pace with the amount of strength possessed by the patient, exercise should be taken in the open air as much as possible, and bathing should be taken carefully and judiciously. The only rule to go by in bathing is to take the bath one has been accustomed to all their life.

Weak hearts and heart diseases are benefited by exercise just as other muscular tissue; but greater care is necessary in the case of the heart because its anatomy is much more complex and its nervous mechanism much more delicate and intricate than that governing other muscles in general; and it is not subject to the same conditions of rest and action that the other muscles are.

In the application of exercise to deformities, the actions of the muscles causing the deformities should be known, and also those muscles which act antagonistically, because it will be found that the latter are the ones whose action, when properly understood and used, will correct the existing trouble. Further, the physician when using any group or groups of muscles to overcome a deformity, no matter whether it be a spinal curvature, a hollow chest, or one of the many forms of deformed feet, should always bear in mind that the development of muscular tissue and stamina is slow and will often take months and even years to effect a cure, and hence he should never despair if, after an apparently fair trial, he has failed. The deformity will be corrected if the physician only has the determination to stick to his work.

Feeble-minded children are greatly benefited by exercise, because it not only increases the vital activity of all the tissues in their bodies by increasing the blood-supply of every part, but also because exercise may be prescribed which is extremely simple at first and which may be made more difficult each day until the mind of the child is receiving the severest kind of discipline, in fact, a discipline equal to if not greater than that received by any study it may pursue in school; in such a case the exercise should always be a voluntary one. In a case where a child is suffering from brain overwork which leads to nervous debility and exhaustion, if an absolute rest is not essential, the exercise should always be an involuntary one or one that does not require mental operations, and even then the physician should have the symptoms of fatigue, overwork, and exhaustion at his finger-ends so that he may not be censured for doing the child more harm than good, and in order that he may recognize them the moment they appear so as to discontinue the prescribed course the child is taking. When the above precautions are not observed, we frequently find a pseudo-typhoid fever resulting, and in some cases a fever presents itself which resembles intermittent; if, however, the exercise be stopped these will disappear.

When exercise is prescribed for liver and digestive troubles one should endeavor to ascertain a most accurate account of the constitutional effect they are producing upon the patient and should immediately employ any drug in his possession to conjoin with exercise, and after the case is well under way the drug should be discontinued, but the patient watched very carefully; in this way much valuable time will be gained in curing the case. In gastro-intestinal troubles we find the appetite failing because the walls of these organs are suffering from paresis, the muscular coats lose their irritability, in consequence of which the functions suffer and hence the organs grow weaker. Exercise will overcome this when correctly applied.

Obesity is a condition brought about by a defective dissimilation of fat, and if exercise be correctly used, adding to it the proper kind of diet, it can be easily remedied; in this way the patient builds up muscular tissue and improves his or her condition by getting rid of the superfluous adipose tissue. Exercise is of extreme importance in regulating the nutrition in our body and is indispensable to the maintenance of health. It also tends to bring every condition of our bodies to a state of equilibrium whereby health is obtained and maintained.

ATHLETIC VASSAR.

By S. Scoville, Jr.

Slow, woefully slow, is this conservative old world of ours in realizing a forgotten truth. The fact that a woman possesses the same divine right to develop physically that man claims has been scarcely known since the days of Greece and the Olympic Games. Then it was accepted and realized as never before or since. There the body of every girl was trained and formed by the same outdoor exercise and practice in the Gymnasia that made her brother a world-model physically. What women were those hewn out of stone by the Grecian sculptors—imperishable reminders of the days when a whole nation of men and women tried to make their bodies what God had intended them to be! No sculptor of to-day can approach the creations of Phidias and Praxiteles—not so much that the skill is lacking as that the models are yet to be. By degrees the world is remembering the precept of Lycurgus: "The fate of a nation's posterity depends upon the bodies of its women." England has known this for centuries, and the English women who can ride to hounds or take a ten-mile constitutional have become famed as the mothers of strong men. On this side there has been a time when it was fashionable for women to be interesting invalids, when pallor was a sign of culture, when perfect health and rosy cheeks were considered a trifle hoidenish. But the present generation has outgrown this folly, and gymnasiums for girls, Delsarte classes, bowling, bicycle and tennis clubs, are all doing yeoman's service in making the American girl of to-day a queen among women.

Even before this age of physical culture, however, some there were, in advance of their time, who recognized its importance. Such a one was Matthew Vassar, who in 1865 founded the college for women that bears his name. From the very first attention was paid to the benefiting of bodies as well as the storing of minds.

Gymnastic exercise in the somewhat primitive gymnasium was compulsory, and outdoor exercise provided for by a large riding-school, maintained by the college, so that every Vassar girl graduated a well-trained horse-woman. This riding-school was abolished in 1878 on the score of expense, and various other out-of-door sports were substituted.

In 1890, however, a new era began for the lovers of athletics and exercise. In that year the Alumnæ Gymnasium, the funds for which were mostly supplied by public-spirited graduates, was completed. This gymnasium is far and away the best in any women's college, and compares favorably with any college gymnasium, with its modern apparatus, spacious battle-ball, tennis, and basket-ball courts, and a marble-floored swimming tank, fed by an artesian well which is one of the largest in this country. Swimming lessons are given in connection with the gymnasium work, and few girls graduate from Vassar without some knowledge of this necessary art. The upper story is used as a tennis-court, while a regular stage at one end, lavishly furnished with marvelously painted scenery—a product of Vassar talent—enables it to be transformed at a moment's notice into a spacious theater, where the college plays are given before enthusiastic audiences.

Another feature, which might well be adopted in larger gymnasiums, is a system of fifty separate dressing-rooms, each provided with a shower or needle bath. This does away with the groups of shivering athletes awaiting their turn at the showers, which one may see even in such magnificently appointed gymnasiums as the one at Yale, in addition to preserving the innate modesty which our male athletes are so apt to lose. The advanced methods of such noted instructors as Sargent, Seaver, and Anderson are employed. Every student, soon after matriculation, takes the Sargent physical examination under the director of the gymnasium, and the work is laid out to meet each girl's especial deficiencies, every student being compelled to take three hours a week of gymnastic work. A new examination is made annually and the work modified to meet the changed conditions. Careful records and charts of each girl's physical measurements are kept, and in every case marked progress has been made.

All through the winter, besides the prescribed gymnastic work, basket and battle-ball and indoor tennis are played in the gymnasium, but it is from her outdoor life and sports that the Vassar girl receives the greatest benefit. The fact is recognized that those exercises which are also pleasures produce infinitely better results than those which are monotonous and mechanical. For this reason out-of-door sports and recreations of many kinds are encouraged, and every day after recitations the majority of the girls are out under the sky, where fresh air and sunshine, the two great health givers, can be obtained in unlimited quantities. Before breakfast, on clear frosty mornings, when the air is full of verve and sparkle, little groups of rosy-cheeked girls can be met speeding along the good roads which surround Poughkeepsie, on their wheels, out for an "appetizer"—returning ready to begin both breakfast and the day's work with redoubled energy.

The bicycling wave seems to have broken squarely over Vassar. The ground corridors of the various dormitories resemble the entrance to a prosperous riding academy in full blast, they are so crowded with wheels. Three girls out of every five at Vassar ride a wheel, be it begged, borrowed, hired, or owned, while the faculty have long ago joined the whirling majority.

"Scorching" is frowned upon, and the "bicycle hump," bicycle face," and other attendant evils are as a consequence unknown. With raised handle-bars and an easy, upright carriage, the girls gain all the real benefit from their wheels that every rider should. The short skirt is the regulation costume, and bloomers are rarely used.

Another out-of-door recreation which seems to be peculiar to Vassar and Wellesley is "birding." "Birding" (which, by the way, is used in a decidedly different sense at our male colleges) is usually indulged in at about sunrise, when the matin-song of the birds begins. Armed with opera-glasses, the "birdists" steal through swamps and thickets, and, by studying the singers in their native haunts, acquire a far greater knowledge of ornithology than can be learned from books. That lover of birds, John Burroughs, who lives not far from Poughkeepsie, was the originator of this recreation at Vassar. He, too, was the founder of the "Wake-Robin Club," which is devoted to the acquiring of ornithological lore.

In the bright autumn days, and again in the spring, when the wild flowers are abloom, the girls don well-worn walking shoes and start off on long exploring trips through the woods and over the picturesque hills surrounding Poughkeepsie, botanizing or noting new specimens of rocks. Pleasant Valley, Cedar Ridge, Boardmans, Richmond Hill—innumerable are the romantic spots from two to five miles distant from the college. Vassar lacks the beautiful lakes that make rowing such a popular amusement at Wellesley and Cornell, and the decrepit state of the boats in use detracts vastly from the pleasure. Withal it is a pastime indulged in to some extent during summer afternoons and evenings.

In winter "bobbing" and skating are the two rival sports, though sleighing parties are always popular. Down snow-covered Sunset Hill and across the hard crust of the Meadow every winter's day, while the coasting is good, speed the "bobs" laden with laughing girls, while the "steerer," fur-gloved, with the steering ropes wound around her arms, guides her load deftly as any man could. On the frozen surface of the "Puddle," as the girls have irreverently christened a diminutive artificial lake, which, through the generosity of Mr. John D. Rockefeller, has been surrounded by a network of water-pipes, the ring of the skates is heard all winter long. Every day the pond is covered with different relays of skaters, and sometimes far into the night, by the light of huge bonfires, the sport continues. Nor is it ended by a fall of snow, as is the case on a natural lake, for the ice is flooded whenever it becomes incrusted or cut up, and a smooth, new surface frozen. An ice-rink from the same donor is kept for the use of beginners in the "art of gliding."

Turning from these recreations to athletic sports proper, Vassar rejoices in a large variety. Golf and battle-ball, although having their devotees, are at the foot of the scale in point of interest. The golf-links (a nine-hole course) have been recently renovated and are exceptionally good, the course including some fine hazards.

In battle-ball three play on a side, the object of the game being to pass the ball (an ordinary football) from the center of the court through the goal of the opposing side. It would be a more popular game if its place were not so usurped by basket-ball.

Lawn-tennis and field sports rank next above golf and battle-ball. There are three clay and six grass courts, and every day during the spring and fall the balls are flying. The courts are situated in the midst of the athletic field, which, surrounded by a thick circle of hemlocks, and only a stone's throw from the dormitories, makes an ideal spot for Vassar's athletic contests. Around the field runs a quarter-mile cinder-path. Here is held every spring the tennis tournament for the championship of the college, which arouses immense enthusiasm among the different classes. Miss Harriet Banks, '96, a prominent member of the Englewood Tennis Club, who ranks well up among the first six women players in this country, has won the College championship for the past three seasons.

Track and field athletics, although of recent introduction, bid fair to become very popular—there having been thirty-nine entries for the initial field day which was held last fall. This field day, which was in the nature of an experiment, proved a grand success. The contestants' knowledge of the canons of training was somewhat limited, but their enthusiasm unbounded. One girl entered in the broad jump, heroically cut down her water-supply to a half-pint per diem, having read that that was the customary quantity imbibed by athletes in training; while all who had brothers or cousins on different college athletic teams wrote to them for the most approved methods. Candy and pastry became dreams of the past, the delightful little suppers at Smith's were forgone, and it is safe to conclude that every girl went "on her mark trained to the minute," as they say on the cinder path.

The day dawned cold and drizzly, but the contestants were undaunted. Men were contraband articles on that day, and the visiting list strictly suspended. A male member of the faculty, who is an enthusiastic follower of athletic sports, officiated as referee, but with this exception all the officials — judges, timekeepers, starter and scorer—were girls. A banner was offered to the class scoring the greatest number of points, and when at 10:30 the starter sternly bade the competitors in the first trial heat of the hundred yard dash to "get set," there was a group of excited spectators, despite the rain, who cheered on the representatives of their respective classes. The two hundred-and-twenty-yard dash was the only event run off on the cinder-path, the short dash, hurdles, and high and broad jumps being held on turf. Taking into account the facts that the events were held in a cold rain and on a slippery turf, and that none of the competitors wore spiked shoes or had ever received even the most elementary instruction in how to run or jump, the times and distances were excellent. The hurdle race was run over the usual distance for the high hurdles— 120 yards — but instead of being the regulation three feet six inches were but two feet in height. The two girls who came together in the finals had each evolved in some unknown way a very fair "hurdle step," and the race resulted in a neck-and-neck finish that set the spectators wild with excitement. The performance in the high jump was much better than it appears on paper, for, owing to the fact that the competitors wear bloomers of the most ample kind, the bar has to be cleared some four inches to allow for the sweep of these nether garments. In the future some ingenious athlete will reduce her bloomer circumference by two or three inches and the Vassar record for the high jump will be broken. The programme was exceedingly well arranged and carried off without a hitch or accident, save that one of the contestants in the high jump sprained her thumb—*not* by stepping on it, as chronicled by certain frivolous-minded reporters. The banner was won by the class of '97. Below is given a list of the winners of the various events and their performances:

Event	Winner	Second	Time or Dist.
100 yd. dash	Miss Vassar	Miss Wilkinson	16 sec. (15¼ made in trial heat)
220-yd. dash	Miss Haight	Miss Thallon	36¼ sec.
120-yd. hurdle	Miss Thallon	Miss Johnson	25 sec. (24¾ made in trial heat)
High jump	Miss Brownell	Miss Baker	4 feet.
Broad jump	Miss Baker	Miss Wilkinson	11 ft. 5 in.

The Vassar records are as follows, accepting as records the best time or distance made in practice. With them are compared the Yale records for the same events, the two practically representing the best athletic performance of our American men and women.

VASSAR RECORDS.		YALE RECORDS.	
Event	Time or Dist.	Event	Time or Dist.
100-yd. dash	13 sec.	100-yd. dash	10 sec.
220-yd. dash	33 sec.	220-yd. dash	22 sec.
120-yd. hurdle	21 sec.	120-yd. hurdle	15 4-5 sec.
High jump	4 ft 8 in.	High jump	5 ft. 10 in.
Broad jump	15 ft.	Broad jump	23 ft.

In the afternoon of this eventful field-day came the basket-ball contests for the championship of the College. This is the game par excellence at Vassar. Each class is represented by an eleven, and, counting substitutes and candidates for places, nearly seventy-five girls play the game and are in training for the class matches. Total abstinence from all indigestible dainties and early hours are insisted upon by the different feminine "coachers" who rule the fortunes of each team, for these important individuals are fully as stern as their male prototypes. The championship match is a most important affair, as the winners in the finals become the champions of the College for a year, and have the proud privilege of wearing a rose and gray 'varsity "V" on sweater and jersey front, an honor which is esteemed as highly at Vassar as the 'varsity "Y" at Yale, or "blue" at Oxford.

The basket-ball field, which is one hundred by fifty yards in extent, has at either end an eight-foot post, with a wire bottomless basket, two feet in diameter, attached. The ball is thrown into the middle of the field by the referee, and passed back and forth until one side or the other throws the ball into the basket, which counts as a goal and scores three points. No kicking, interference, or running with the ball is allowed, but there is a great opportunity for team work and scientific playing, and some of the passing and catching displayed by the players is of a very high order. The forwards follow the ball, which is a round pigskin affair one foot in diameter, like a flash, and some of the veteran elevens develop a code of signals and system of plays as elaborate as those displayed on the football field. In truth, the championship match this year forcibly recalled to the writer's mind vivid memories of class football games, though various femininities emphasized the sex of the players. Long before the game was called, the side lines were crowded with adherents of the different classes, each decked with streamers of class colors and well primed with class cheers, fearfully and wonderfully composed, after the fashion of all class cheers. "Hippity-Bus! Hippity-Bus! What-in-the-world-is-the-matter-with-us?" vociferously question a group of '97 girls, and reassuringly answer their own question, as soon as they can recover breath, by "Nothing-at-all! Nothing-at-all! We-are-the-girls-that-play-basket-ball! *Ninety-Seven!!*" While '96 chortles defiance from the other end of the field with—"Rah! Rah! Rah! Rah! Rah! Rah! V-A-S-S-A-R! Ninety-Six!!" Finally the two teams which have been drawn for the preliminary match file on the field, and the uproar becomes deafening. Various original basket-ball songs are chanted loudly from the side lines, which the singers fondly imagine will hearten their eleven and strike terror to the minds of their opponents. The teams are clothed in sweaters, blouses, bloomers, and tennis-shoes, and the full puffed sleeves of the former prove fashion to be all powerful even on a basket-ball field. Each girl wears her class colors attached to the dangling braids which adorn every head. A number of players on crutches, fresh from the infirmary with sprained ankles, and the presence of the resident physician of the College with a roll of bandages and bottle of liniment, prepared for similar emergencies, lend a genuine football atmosphere to the scene. The team lines up. Each player takes her place as a link in the long, irregular double chain that stretches from goal to goal. The referee tosses the ball into the middle of the field to the six rival forwards who are grouped there. One active little figure leaps high in the air, seizes the ball with a cat-like motion, and has passed it to a back stationed behind her, almost before the spectators have realized that the ball is in play. A long double pass, a feint, a criss-cross pass, and the ball is in the hands of the "pitcher," one of whom is stationed beside each goal. Five seconds the pitcher has in which to essay a goal. Very deliberately she poises the ball in one hand, measures the distance with her eye—a quick motion, and the ball flies up beyond the outstretched hands of the opposing players, who leap to intercept it, and falls true in the basket—the first goal. What a storm of cheers goes up as the ball is brought back to the referee to be put in play again! And so the game continues, with varying fortunes. Each game consists of four ten-minute quarters, with five minutes' intermission between the quarters. During the game the remaining teams, who are to play next, lie around on the side lines well swathed in blankets, watching the play, eager to obtain a line upon the methods of their antagonists, while the captains and coaches move around giving their teams last words of advice and warning.

Last fall the juniors had a happy time with the untrained freshman team, defeating them by a score of 50–0. The sophomore eleven was unfortunate in having several of its best players laid up shortly before the game, and so defaulted to its senior opponents. This brought the senior and junior teams together in the finals. The game was the closest ever played at Vassar. The seniors at first led, but the careful training of the '97 team became apparent in their superior condition in the last quarter, and, just as it was becoming too dark to follow the ball, time was called with the score 48—36 in favor of the juniors.

A word, in closing, as to Vassar's athletic policy. First and foremost, the faculty desire, above all things, that the doctrine of "laissez-faire" be applied to the College, that Vassar be left alone to develop on the truest and broadest lines. For years the first college for women has suffered the fate of all pioneers in a new line of progress, and has been made a target for cheap newspaper wit and ridicule. This prying spirit of misinterpretation is what more than all else has interfered with Vassar's progress.

As to the problem of athletic competition, Vassar has solved it satisfactorily to herself, and the solution is one that has many advocates among those who have most deeply studied the problem of athletics among our larger colleges. Vassar enters no intercollegiate contests, but in their place are instituted games between the classes. The contestants have their friends and acquaintances for opponents on the field, and come in daily contact with them in hall and classroom. The result is that a spirit of generous rivalry is developed, never rising to that blood-heat which is so apt to imbue the male college athlete with the true Roman spirit that regards every stranger rival as an enemy, and is responsible for most of our intercollegiate dissensions.

As a result, the Vassar athlete displays that unselfishness which among men characterizes the truest sportsmanship. Little acts of courtesy, of helpfulness, of true womanliness, are everywhere apparent in the college competitions. A case in point occurred in the last basket-ball match, in which the writer saw a player warn an opponent against a mistake that would cost her side several points.

As to the utility of athletics at Vassar, the results are an unanswerable argument in their favor. When definite statistics show that every girl graduates from Vassar stronger and better trained physically than when she entered and better equipped for her life-work, it is impossible to inveigh against the system that brought this state of affairs to pass.—*The Outlook.*

DUST AND RAIN.

UNTIL lately we have been accustomed to look upon our atmosphere as constituted solely of gases, with a dash of dust and dirt in it, which belonged principally to large towns and manufacturing districts; now we learn that we must extend our views and look upon dust as a constant and very important constituent of our atmosphere. Mr. Aitkin, who has with so much ability and success investigated this subject, tells us that "if there was no dust in the air there would be no fogs, no clouds, no mist and no rain." He has, in fact, shown that it is the fine particles of solid matter—some probably so fine that a microscope can hardly distinguish them—which determine the condensation of aqueous vapour, each particle becoming shrouded in a covering of moisture, and thus producing a haze, a fog, or a cloud.

That a given space could for every temperature hold as gas a given amount of water was well known, and the simple reduction of temperature seemed a sufficient explanation of the deposition of moisture in the form of fog or rain; now, however, we are compelled to admit that this change as occurring in our atmosphere is determined, not by mere reduction of temperature, but by the presence of particles of dust; some kinds of dust producing this charge far more readily than others. If the particles be few or many, large or small, so will the nature of the aqueous cloud produced vary; it may be a haze or a mist, a wet or dry fog, a dense or thin cloud. A jet of stream issuing into the air gives, as we see every day, a dense white cloud, but let this same jet issue into air free from dust—air filtered through cotton wool—and not the slightest indication of the white cloud is visible; thus can the influence of dust in the air be simply demonstrated. In fact, not only every puff of steam, but every visible exhalation of our breath on a cold day, is a demonstration of the dust which is in the air.

Mr. Aitkin has employed this condensing power of dust to determine the amount present, and it is not a little remarkable that the accurate estimation of the amount is actually made by counting the number of particles. A given volume of the air to be examined is diluted, much or little, with dust-free air, and by lowering the temperature, which is done by slightly expanding the gas, each particle condenses on its surface a modicum of water, and consequently swells in size and increases in weight. If this be done in a glass vessel in which is a polished silver mirror ruled in small squares, and on which rests a known amount of this diluted air, it is easy with a magnifying glass to count, in many of the squares, the number of aqueous particles which have settled on it, and each one represents a separate particle of dust; thus we learn the number in the cubic inch or cubic foot of air. Once on the top of Ben Nevis, under peculiar cyclonic conditions, air with only 34 particles of dust to the cubic inch was found, but this air was far more dust free than is ordinarily met with in Nature.

If the air be still, dust naturally accumulates in it; rain and wind are the great dissipators of dust and purifiers of the air. At Falkirk, Mr. Aitkin, after a wet and stormy night, found 521,000 dust particles in a cubic inch, but on dry days the average number was 2,119,000; in a room where two gaslights were burning at 4 feet from the floor he found 30,000,000 particles and near the ceiling, 88,000,000 particles.

Everywhere, then, dust is present; at the top of the Rigi in every cubic inch we find 10,000 to 20,000 particles of dust. A southeast wind on the Simplon Pass may bring us 200,000 particles in the same bulk of air. Cannes and Mentone are far from being free from dust, and even in the air over sea it is found to be present; and in addition to all our terrestrial dust, from the higher regions comes meteoric dust, which no doubt plays an important part in the formation of clouds which are high above our earth.

Microbes and their spores must form a part of this dust of the air, and act as other finely-divided solid matter acts, condensing moisture, and travelling far or falling soon according to their weight and power of condensing moisture. Certain it is, that the lower atmosphere is more charged with organisms than the higher, for Dr. Percy Frankland found that while 10 litres of air collected at the base of St. Paul's contained 56 micro-organisms, the same volume, collected at the stone gallery, contained only 29, and collected at the golden gallery only 11. Even if most organisms from their size or their weight have a strong tendency to separate out from the air, still there must be many which, like the dust from the great Krakatoa eruption, will remain long suspended, and be carried to great distances; and certain it is that in future, in considering the functions and the healthiness of air, we shall have to reckon with this ever-present constituent—dust.—*British Medical Journal.*

THE
DIETETIC AND HYGIENIC GAZETTE
A MONTHLY JOURNAL OF PHYSIOLOGICAL MEDICINE

VOL. XII. NEW YORK, SEPTEMBER, 1896. No. 9

HEREDITY AND VARIATION.

By LAWRENCE IRWELL, M. A., B.C.L.

As THE earth is kept in an orbit, which makes life possible by the balance of the antagonistic centripetal and centrifugal forces, so is that life evolved and maintained by the balance of the two conflicting forces of heredity and variation.

Heredity, the principle which makes offsprings resemble their parental organisms, may be considered as the centripetal force which gives stability to species; while variation is like the centrifugal force which tends to make them develop into new forms, and prevents organic matter from remaining ever consolidated into one uniform mass. When a moneron, or living piece of pure protoplasm, or its successor the nucleated cell, propagates itself by simple division into two equal parts, it is obvious that each half must, in its atomic constitution and motions, exactly resemble the original. If amoeba No. 1 divides into amoebae Nos. 2 and 3, both the latter two are exact facsimilies of number 1 and one of another, and so are the progeny of Nos. 2 and 3 through any number of generations. They must, of course, remain identical repetitions of the parent form, unless some of them should happen to be modified by different actions of their surrounding environment, powerful enough to affect the original organization. The moot point as to whether amoebae continue to propagate indefinitely by subdivision, or whether at some period propagation ceases unless two individuals come together is too lengthy for discussion here

In the propagation by germs or buds, the same thing must hold good as in propagation by fission, only, as the offspring carries with it, not the half, but only a small part of the parental organism, its impress will be less powerful, and the new organism will more readily be affected by external influences. When we come to propagation by spores or single cells, and still more to the sexual propagation by the union of single cells of two progenitors, it becomes more difficult to see how the type of the two parents, and of a long line of preceding ancestors, can be maintained so perfectly.

Of the fact that it is maintained there can be no doubt. Not only do species breed true, and remain substantially the same for immense periods, but the character of individual parents and their ancestors repeat themselves, to a great extent, in their offspring. It is well-known, of course, that the cross between the white and black varieties of the human species perpetuates itself to such an extent, that a single cross of black blood leaves traces for a number of generations. In the Spanish American States and the West Indies, where the distinction is closely observed, the term "octoroon" is commonly applied to creoles who have seven-eighths of white to one-eighth of black blood in their composition. In the case of what is called "atavism," which means recurrence to the character of ancestors more remote than the immediate parents, some very remarkable phenomena may be observed. Perhaps one of the most stricking cases is that of Lambert "the porcupine man," mentioned by Darwin in "The Variation of Animals and Plants under Domestication."

In breeding animals, it is not uncommon to find the peculiar features of generations of ancestors long since extinct cropping up occasionally in individuals. Horses having stripes like those of the ass along the back and down the shoulders, sometimes appear in animals whose immediate ancestors for many generations back showed nothing of the sort; and even stripes across the legs like those of the zebra occur quite unexpectedly in the equine family, and testify to the common descent of the various species of the horse tribe from a striped ancestor. How these ancestral peculiarities can be transmitted through many generations, each individual of which originated from a single microscopic cell which has been fertilized by another cell, is one of the greatest mysteries of nature. It may assist us in forming some idea of the possibility of a solution to remember what has been proved as to the dimensions of atoms. Their order of magnitude is that of a child's small ball to the earth. In a single microscopic cell, therefore, there may be myriads of such atoms circling around one another and forming infinitesimal solar systems of infinite complexity and variety. Darwin's "Provisional Theory of Pangenesis" supposes that some of the actual identical atoms which formed part of ancestral bodies are thus transmitted through their descendants for generation after generation, so that we are literally "flesh of the flesh" of the primeval creature who developed into man in the later tertiary or early glacial period. This theory has not met with any general acceptance. Haeckel suggested the hypothesis that, not the identical atoms, but their peculiar motion and mode of aggregation have been thus transmitted, and he has named this mode of transmission the "Peregenesis of Plastids." There are any number of other guesses at the truth, the theory of "physiological units" of Mr. Spencer being the one which involves the hereditary nature of acquired characteristics, while "the continuity of the germ-plasm," the hypothesis of Professor Weismann, involves the belief that such characteristics are never inherited. It is sufficient to say that a solution of the various problems of heredity is by no means impossible.

The principle variation is quite as important to the human race as is that of heredity. It is apparent in the fact, that although every individual of every species reproduces qualities of parents and ancestors, no two individuals do so in precisely the same manner; no two are exactly alike. This difference, or individuality, becomes more marked as the organism becomes higher, and while the differences between horses and dogs are only observed by ordinary people with difficulty, the distinctions between human beings are so marked that, of many millions existing in each generation, no two exactly resemble one another. The reason of this is apparent, if we consider that the higher the vital form the more complex are its parts, and the less the chance of the whole complicated relations of parent and ancestral organisms being transmitted by single cells so solidly and completely as to overpower and remain uninfluenced by external influences. Darwin's theory of Natural Selection, which is now fully recognized as true by the entire scientific world (except Professor Virchow and Sir William Dawson, who still deny the verity of the entire theory of evolution) is this. All forms of life tend to vary, the variation depending mainly upon the influences of environment. If the exterior layer of molecules of a mass of protoplasm becomes differentiated from the interior ones and forms a cell-wall, it is because the layer is in more immediate contact with the air or other surrounding medium. Internal changes depend on other conditions, such as temperature and nutrition. In the case of cultivated plants and domestic animals, we can see most clearly how varieties are produced by adaption to changes of environment These variations, however, would not proceed very far, were it not for the interaction of the opposing forces of variation and heredity, the latter power accounting for the variations which appear in individuals becoming fixed in those individuals. It is certain that the process of Natural Selection—the struggle for existence—gives victory and survival to those forms, and eventually to those forms only, whose variations, slight as they may be, tend to bring individuals into better adaption to their environment.

To Charles Darwin and Alfred Russell Wallace the credit is due of having firmly established by an immense amount of evidence the scientific explanation of the most important factor in evolution. Every day fresh discoveries and experiments confirm the great principle of the adaption of the individual to its external surroundings, and it has almost passed into the same phase as Newton's law of gravity, as a fundamental law accepted as axiomatic by all men of science and as the basis of modern thought, to which all philosophies necessarily conform. And while Darwinism was most virulently attacked by the various churches from 1860 to 1874, these attacks have now ceased, and some enlightened clerics accept the teaching of modern science with more or less reserve. If, however, they understand the facts as to degeneration and panmixia—the cessation of natural selection—my conviction is that a reaction against the entire verity of evolution would make the clerical world once more conspicuous as the opponent of science. The fact is that investigators who have to deal so much with actual facts and accurate knowledge, are apt to be very cautious and modest in their assertions. Theologians, upon the other hand, whose studies have lain in the direction of ideas and vague generalities, which are necessarily extremely indefinite, are in the habit of making guesses at the truth, instead of trying to prove the accuracy of their aspirations or hypotheses by the study of nature.

I now propose to give a few examples of the operation of variation in working out the evolution of species.

An amphibious animal called the triton, akin to the frog, begins its normal life in the water, breathing by gills, and ends it with gills altered into lungs. But if these creatures are kept in a tank full of water they never lose their gills, but continue through life in the lower stage of development, and breed in the larva stage, producing, of course, gilled tritons. In this connection it may be well to mention as a proof of the result of external surroundings that the metamorphosis of the tadpole into the frog may be prolonged, probably indefinitely, "merely by feeding them very scantily." (Variguy. "Experimental Evolution" p. 110.)

The axolotl, a curious gilled Mexican Sanamandra, has its normal course to live, die and propagate its species in water, breathing by gills; but when an axolotl strays from the water and takes to living on dry land, the gills become modified into lungs and the animal gains a higher position in the vertebrate world. When we remember that the embryo of all vertebrated mammals, *including man*, passes through the gilled stage before arriving at the development of lungs, the above facts assist us in realizing how terrestrial life may have arisen from aquatic life by adaption to altered conditions; and how the evolution of the embryo sums up in the individual, in a period of a few days or months, the various stages of evolutions which it has taken millions of years to accomplish in the species.

As a parallel to the transformation of gills into lungs, and of an aquatic into a land animal, if we turn to the geological records of the secondary period we may trace the transformation of a water into an air population, of sea-lizards into flying lizards, and of flying lizards into birds. The "Hesperornis" is an actual specimen of the transition, being a feathered creature, which is half lizard and half bird.

That a change of functions may be produced by a change of outward environment is shown by the observations upon the common ringed snake, which in its natural state lays eggs which take three weeks to hatch; but if confined in a cage in which there is no sand, it hatches the eggs within its own body and produces its young alive. This may help us to understand how the monotremata, the lowest order of mammals, such as the Australian duck-billed mole, may have developed, first into a marsupial, like the kangaroo, and eventually into a placental animal. And here I leave the subject of heredity and variation in the hope that the reader may understand how the infinite diversities of living species have been developed in the course of evolution from simply origins, just as the inorganic world was developed from atoms, by the action and reaction of primitive polar forces between the organism and its variation, and by adaption to external surroundings.

SOME REMARKS ON THE HISTORY OF THE GREATER EPIDEMICS OF THE PAST, AND THE MANNER OF TRANSMISSION.*

By U. O. B. Wingate, M, D.,

Professor of Diseases of the Nervous System and Hygiene in the Wisconsin College of Physicians and Surgeons, Milwaukee, Wis.

It is only possible, during the few moments allotted to me at this time, to refer, in the briefest possible manner, to some features of certain epidemics in the past. I shall only consider the four diseases which stand at the head of epidemics,— namely, the plague, Asiatic cholera, yellow fever, and small-pox.

I. THE BUBONIC PLAGUE.

This is a disease of great antiquity. The first extensive epidemic of which history has given us any definite account occurred in the sixth century, is described as "the plague of Justinian," and is said to have persisted during nearly the whole of that emperor's long reign. It probably originated in Lower Egypt in the year 542 A. D. It swept with increasing fury over Asia Minor; it also visited Constantinople with the result that for some days people died, so it is related, at the rate of 10,000 daily. For seventy years this disease raged in all parts of the then known world, and its victims were numbered by millions. In the fourteenth century it appeared under the name of the "black death," and is said to have destroyed 130,000,000 in China, 24,000,000 in other Oriental countries, and not less than 25,000,000 people in Europe. The same disease is classed under the head of 'the great plague of London," which occurred in 1665, when the total number of deaths is placed at 100,000. The same plague occurred at Marseilles and Toulon in 1720. Its last appearance in Europe was reported to be at Dalmatia and Turkey in 1840–41. The bubonic pest, however, has never ceased to exist in China, showing itself more or less frequently, and spreading from there, from time to time, to Persia, Arabia, and Asiatic Russia. It is probable that for the past fifteen years it has continually existed in the southern part of China, and the recent outbreak there shows that its virulence is no less than existed formerly. According to the official reports for the six months from February to July, 1894, inclusive, in Canton, which has a population of about 1,000,000, there were 180,000 deaths. The official reports from the city of Hong Kong up to August, 1894, showed that 2,504 deaths occurred from this disease out of a population of 200,000. It is, however, believed, that as every Chinese man and woman, when seized with it, got over to the mainland, if he or she possibly could, the actual number of deaths out of that population was probably much higher.

The death-rate is simply enormous. Yersin places it as high as 95 per cent. even in hospitals. In this recent outbreak the disease occurred among the Chinese principally, more especially among women and children, and among those who were the least able to resist the invasion of any disease. It was also observed that it raged worse among families living on the first floor of houses next to the ground, and that those living on the water, in many instances, escaped, which leads us to believe that the condition of the soil has something to do with the spread of the disease.

---

* Journal of the American Medical Association.

From the investigations made by Kitasato and Yersin, there is no longer any doubt that the bacillus has been isolated by them, and, thus far, they have been unable to observe that the bacillus has any spores. It is claimed that the bacillus enters the human body by three channels—through the respiratory and digestive tracts and through an external wound. It seems to be a disease of poverty, and flourishes best in overcrowded localities where there is a lack of proper ventilation, personal cleanliness, and proper and sufficient diet. It is a typical infectious disease; a filth disease caused by a bacillus. There is no doubt that it has been and can be transmitted through merchandise, such as rags and other material, that may be shipped from one place to another. Just how long the bacillus may live under certain conditions does not seem yet to have been demonstrated, but it is believed that it will live for a long period under favorable conditions. We do know, however, that it can be easily destroyed by the degree of temperature employed in disinfecting by live steam. It is probably transmitted by food, drink, and air. Like cholera, it has followed the channels of commerce. In the recent outbreak it found its way from Yunan along the southern border of Kwang-See to Pakhoi, from whence it travelled northward through the Kwang-Tung province to Canton. From the latter city it was readily conveyed to Hong Kong by persons removing while actually suffering from the disease, or during the period of incubation. It only requires about eight hours of time, by steamer, to pass between these two cities, and in the late epidemic it was quite common to have several deaths occur on the passage between these two points. According to Mr. Rocher, pigs, goats, rats, and other animals die in great numbers before man is affected, and it has been noted that a high mortality exists among these animals two or three weeks before cases of plague are noted in the human family. Just what the relationship may be in regard to this matter is a question not yet fully worked out or understood. Yersin has called attention to the results of his autopsies of animals, which showed that many dead flies are found. On examination of their bodies, he found them to contain the plague bacillus, and an inoculation of guinea-pigs from such flies caused death within forty-eight hours with specific lesions of the disease. There is not much question that this disease may be carried to any part of the civilized world, and an outbreak in any locality should be watched very carefully by sanitary authorities.

II. ASIATIC CHOLERA.

The history of epidemics of this disease, prior to the seventeenth and eighteenth centuries, is so imperfect that we cannot depend very much upon it. Mention is made of it in the Sanscrit and Chinese writings; it is also spoken of by Hippocrates, Celsus, Galen, and others, but we do not find a clear description of it, as existing epidemically, prior to the seventeenth century. Since then it has occurred as an epidemic in so many localities that it would be impossible to name them all. As long ago as 1768–71, Sonnerat described an epidemic in the neighborhood of Pondicherry which destroyed 60,000 lives. In what was then known as French India in 1780–81 it also prevailed, and we also have reports of epidemics occurring in Madras from the years 1774–82. The first really famous epidemic dates from Jessora in 1817, although it has been proved that other cholera epidemics existed in India prior to this. In 1817, in Jessora, a city some forty hours ride northeast from Calcutta, there existed a patient who had been seized in the night with violent vomiting and diarrhœa.

A local Indian physician called on an English physician, Dr. Robert Tytler, to see this patient. He found him moribund, and thought at first that it was a case of poisoning, but when he learned that some seventeen other cases had been attacked at the same time and had quickly died, he came to different conclusions. This was a case of genuine Asiatic cholera, and so rapidly did the epidemic spread that within two months, in the city of Jessora, more than 10,000 of the inhabitants had died. During this same year the disease prevailed throughout the whole of English India, reached Calcutta in September, and caused a heavy mortality. An army encamped on the banks of the Sind lost within a short time 764 officers and European soldiers and about 8,000 Sepoys. In the first year the number of cholera victims is given as 600,000. It is possible that this number is somewhat exaggerated, as statistics under such circumstances are unreliable, and were especially so at that early age. Cholera spread over all of Bengal in 1818, and it is reported that in Benares 15,000 persons died in two months. Epidemics spread northwardly, then westwardly, then southwardly along the coast of Coromandel, and out of 18,000 men composing General Hastings's army, stationed between Bombay and Calcutta, 9,000, or 50 per cent., died in a short time. In 1820, Bengal was again severely attacked and the epidemic penetrated to Cochin China, also to Canton. In 1821 the disease passed across the mouth of the Indus and spread itself along the coast of the Persian Gulf, whence it extended into the interior of the land. It soon appeared in Bagdad and other places. It spread also towards the East, sowing everywhere the greatest destruction, especially in Borneo and Java; the latter place is said to have lost 100,000 inhabitants. In 1823, Burmah and the empire of China, the latter especially, were severely attacked with cholera, and about this time it showed itself for the first time on Russian soil. It spread in a westerly direction and invaded the empire of Russia. In 1823 it penetrated the very borders of Europe. In the following three years cholera made but little progress in the two threatened divisions of the earth, Europe and Africa, and towards the close of the year 1826 the hope was cherished, says Lebert, that the epidemic was near its end, but as early as the beginning of 1827 it appeared with renewed intensity in Calcutta, and here is mentioned, for the first time, that many animals also showed the influence of the disease. In 1830 its advance towards the northeast was more positive than before. It soon again extended on the coast of the Caspian Sea; Orenburg, which had been already reached in the last months of 1829, was again attacked, and, it is related, one-tenth of the whole population was seized with cholera.

There is something peculiar in the mode of transmission of this disease, inasmuch as in times past it seems to have encircled the world, when it has once started, before the pandemic has ceased. While it has been said to be a water-borne disease, there are some facts which hardly coincide with this theory, for we find it has travelled over mountains and through every part of the known world, apparently independent of water-courses. Early in 1831 it appeared in Mecca and raged with great violence; later it appeared in Alexandria and Cairo; the latter place is said to have lost 30,000 people by it in the first months. In Egypt the disease penetrated up the Nile to the higher regions of this country. Constantinople was also attacked within this year, and Smyrna was seized and suffered very severely from it. It occurred in the same year in various parts of Russia, and on August 30 entered Berlin, where it caused 2,500 deaths among 200,000 inhabitants. In the northern part of Germany, at this time, it was observed to affect chickens, pigeons, and in many rivers fish perished in great numbers. In October it reached England and soon spread over the islands of Great Britain. The following March it reached Paris, where it raged with extraordinary intensity, destroying one-forty-third of the whole population. About the middle of 1832 it crossed the Atlantic Ocean and appeared in North America at Quebec and Montreal, travelling quickly from there to New York, Philadelphia, and Baltimore, and as far south as New Orleans. In 1833 it invaded the Mexican States and was very severe in Vera Cruz and Mexico. Since that time the history is familiar to nearly every one. Its home is well known to be in India, where it is constantly present, and from which place, when once started, it spreads to all parts of the world before it stops. It reached this country again in 1848, appearing first at New Orleans, and again in 1853–54, extending over a considerable portion of the United States. The next great epidemic in Europe persisted from 1865 to 1874, about ten years. Europe then enjoyed a complete immunity for a period of ten years, or up to 1884. In 1883 the scourge made its appearance in Egypt, where in three or four months it occasioned a mortality of from 30,000 to 50,000 of the inhabitants. In the autumn of 1887 it made its appearance in the port of New York, but was controlled by prompt and efficient measures of isolation at the quarantine station. It again appeared at the same port in 1892, where it received like treatment. The epidemic of cholera in Europe in 1884–85 is said to have cost France 15,000 inhabitants, Spain, 180,000; Austro-Hungary, 4,000; Italy, 50,000; Malta, 500, making a total, approximately, of 250,000 inhabitants of Europe.

We know that the specific germ of cholera, as well as that of the plague, has been isolated, and the value of the discovery of the germs of these two diseases cannot be over-estimated, for it enables us to take definite precautions to prevent an introduction of these diseases and to control them if introduced. But there is much to be learned concerning the habits and conditions favorable to the propagation of the germ of cholera. We believe we can control it if we can persuade the people to be liberal in their appropriations of money, which is necessary in order to take the requisite precautions. Then, again, it is of the greatest importance to be enabled to control the people should an outbreak occur.

In concluding this portion of my subject, I wish to refer to the very large increase of diarrhœal diseases that has prevailed during the past year, and especially in our own State. The idea has been suggested that the great prevalence of diarrhœal diseases is indicative of approaching cholera. Is it possible that such conditions, with others, may favor or invite this disease, and may such conditions not be a part of the general causation, while the germ completes the cause?

III. YELLOW FEVER.

Haenisch says, "The Antilles were probably the cradle of yellow fever." According to Hirsch, the range of the distribution of this disease over the earth's surface takes one of the lowest places among acute infectious diseases. He says, further, "If we disregard its isolated appearances at different points on the western shores of Europe and its quite recent establishment as a prevalent form of sickness on the Atlantic and Pacific coasts of South America, there remain only two among the great regions of the globe to form the seat of yellow fever; on the one hand, the shores of the Gulf of Mexico, including the West Indies and part of the Atlantic coast of the United States, and, on the other hand, a part of the west coast of Africa."

The earliest history of yellow fever is enveloped in obscurity. It seems to have originated either on certain islands of the West Indies or on vessels sailing from those points to certain points on the Atlantic and Pacific coasts. The area over which it has spread in times past is certainly circumscribed. That the germ, if one exists, has not been demonstrated has been clearly shown by Sternberg. There is no doubt but what it is the natural offspring of regions and places characterized by the presence of putrefying organic matter under a high temperature. The persistence of yellow fever aboard ship necessarily involves the question as to its direct cause, but whatever difference of opinion may exist as to the nature of the virus of yellow fever, there can be no question as to the conditions of its existence. Decomposition of organic matter under certain climatic conditions is an essential requisite. It was formerly believed that yellow fever could only occur during certain months of the year, from April to November. It is now, however, known that it may occur during any month of the year within the area called the "yellow fever zone."

The first trustworthy account of an epidemic of yellow fever dates from the year 1635, when it prevailed on the Island of Gaudeloupe. The adjoining islands, Dominica, Martinique, and Barbadoes, were invaded a number of times in the fifty years following. Since then it has occurred on the Mexican coast and the West India Islands, and on the west coast of Africa. During and since the eighteenth century, yellow fever has also frequently extended up the eastern coast of North America, the highest points reached being Halifax and Quebec. It appeared in the United States in Boston in 1693; in Philadelphia in 1699; in New York in 1702; in New Haven, Conn., in 1742; in Norfolk in 1747; and first made its appearance in New Orleans, where the greater epidemics have existed, in 1796. It has never gained a permanent foothold in the United States, having always been brought from its source in the West India islands, or in that locality. It is impossible to give a detailed account of all the greater epidemics from this disease. The places in the United States in which they have occurred are numerous, including Boston, New York, New Orleans, Philadelphia, Charleston, Mobile, Pensacola, Norfolk and Baltimore. The more important epidemics occurred as follows: In 1783 in Philadelphia with 4,040 deaths, said to have equalled 10 per cent. of the population; in 1797 in Philadelphia with 1,300 deaths; in 1798 in Philadelphia and other places (including New York) with 5,700 deaths. In 1853 the States of Florida, Alabama, Louisiana, Mississippi, Arkansas, and Texas were invaded. The deaths in New Orleans, during this epidemic, are reported to have been 7,970. In 1867 it invaded Texas and Louisiana; deaths in New Orleans 3,093; in Galveston, Texas, 1,150. In 1873 the States of Florida, Alabama, Mississippi, Louisiana and Texas suffered severely, and in 1878 the most extended epidemic in the United States occurred, according to Sternberg, invading 133 towns, chiefly in Louisiana, Tennessee, Alabama and Mississippi, where there were 74,000 persons attacked, with 15,934 deaths.

It has been frequently transported to European points from its source, but has not spread extensively at those points. The fatality has varied very much in different epidemics. It is more fatal to persons who are unacclimatized than to others. Among unacclimatized adults the fatality ran from 20 to 60 or even 80 per cent. No race is entirely exempt but there is no doubt that negroes are decidedly less susceptible than the white race. They are less liable both to attack and to death in the event of attack. Both the attacks and deaths are more numerous among males than females. This is, no doubt, largely owing to the greater exposure of males, and to their habits, especially over-indulgence in alcohol.

In regard to the manner of transmission or mode of dissemination there is strong ground for the belief that it is a microbic disease, although not yet demonstrated. It cannot survive cold weather, and the first one or two frosts destroys its vitality. Under certain conditions, however, it can be carried in merchandise, vessels, and especially where there is a lack of cleanliness. It is believed to be easily conveyed in old vessels that are undergoing decay. Just how this disease enters the human body is not yet known. It is certainly infectious, and the poison is claimed to be as specific as atropia or hydrocyanic acid. It can be transported from place to place in the ordinary vehicles of travel and traffic, and in the bodies or baggage of men and women. It seems to take root, however, in the locality, in the soil as it were, and to be contracted from the environment of the patient rather than the patient himself; the locality seems to remain infected after the patient has been removed, for weeks and even months. There is a very important circumstance connected with the transmission of this disease which, I believe, should receive very careful attention from all members of the medical profession. It is a condition which exists as a warning in other diseases, as has been referred to under the head of cholera. It was first mentioned, so far as I know, in the surgeon-general's report of the Navy Department for 1873-74, by Dr. Joseph Wilson, medical director of the United States Navy, under the head of "An Interesting Epidemic." He says: "There is a variety of yellow-fever poisoning which seems not to be generally understood; at any rate, not generally insisted on. I allude to the numerous cases of light febrile disease which precede the development of the fully-formed fatal cases of yellow fever, usually noticed in the first cases of an epidemic. Every writer on epidemic cholera tells us of the numerous cases of diarrhœa preceding the epidemic, but no one describes these numerous cases of slight febrile disease, which are the harbingers of the yellow-fever epidemic." He then goes on to show that for some time before an outbreak of yellow-fever they had a large number of these febrile conditions—some diagnosed as mild typhoid, some as simple fever, etc.—followed by an epidemic of yellow-fever. An interesting feature connected with epidemics of this disease, as well as others, is the commercial relation and the difficulty that sanitarians have in impressing upon the people the importance, not only from the stand-point of life-saving, but from a commercial stand-point, of controlling these outbreaks. This has been well illustrated by Dr. Samuel Choppin, of Louisiana, in describing the epidemic of yellow fever that occurred in this country in 1878. It appears that an estimate of the total loss to our country from this epidemic way made by Mr. A. B. Farquhar in a letter to Surgeon-General Woodworth, in which he places the cost at $175,000,000. In New Orleans alone there were estimated 25,000 cases with 4,500 deaths, and the cost to that city, based upon a moderate estimate, was $12,072,500. It is also shown that the city of New Orleans, by its commercial interests with the tropical ports from which this disease was brought, amount to about $1,500,000 per year, while the loss in one year by the presence of yellow fever is estimated at over $12,000,000. Dr. Choppin, referring to the quarantine system, which is impossible to make perfect on account of the commercial interests, very wisely says, "No conditional quarantine can ever be made effective, because, first, of the laxity with which laws are unfortunately executed in this country, and, secondly, because of the cupidity of the commercial men having large interests at stake, who will always move heaven and earth to evade successfully all quarantine laws and regulations." Until people can be educated up to the point of recognizing the importance of these sanitary measures, we can never expect to be able to control epidemics, and they will occur from time to time, for it seems to be a law of nature that people must learn by experience alone.

IV. SMALL-POX.

It hardly seems necessary for me to refer to this subject, because I take it for granted that all present have learned the lesson of experience that I have just quoted. This is another disease, the essence of which is unknown to us, as you all know. We do have, fortunately, a means of prevention, which is not provided for positively in the diseases that I have just mentioned, that of vaccination. It would be impossible, in a few words, to even scan the history of small-pox. The earliest records of its existence are to be found in Hindostan and China very many years before the Christian era. It has invaded all parts of the world from the earliest history, and at times the havoc caused by its ravages has been something appalling. One of the earliest writers was the Arabian, Ahron, who practised in Alexandria in the time of Emperor Heraclius, 610 A. D., but for what is known of these writings, and others, we are probably indebted to Rhazes, physician to the hospital at Bagdad, who died about 923 or 930 A. D. He was the first to distinguish small-pox from measles. Epidemics from this disease are too numerous to mention. The more severe, perhaps, occurred in Iceland, the records of which are to be found in those of the Danish government; the worst epidemic of all occurred in 1707, among a population of somewhat over 50,000 it carried off 18,000. In Ireland, where the lamp of learning burned all through the Dark Ages, we find that this disease raged to a great extent, and a very interesting chapter might be written concerning this if time allowed. Emerging from the Dark Ages, Vidus Vidius, 1550, incidentally refers to it as attacking all persons in the course of their lives, and Mercurialis, born in 1530, holds that almost every person must have it once. Many others at this time used similar language, and it seemed to be the general impression that every person born into the world was liable to, and most probably would at some time have, small-pox. Sir Gilbert Blane is credited with the statement that "it had destroyed a hundred for every one that had perished by the plague." George Bell, of Edinburgh, in 1802, wrote that small-pox was one of the most severe and dangerous diseases to which mankind is subject.

The full power of the disease, however, can only be seen as we learn its ravages in the New World, among unprotected populations. This began in 1507 in the West Indies, where it was so disastrous that whole tribes were exterminated; in Mexico, it is related, it even surpassed the cruelties of conquests, suddenly smiting down 3,500,000 of the population and leaving none to bury them. In Brazil, in 1563, it extirpated whole races of men. At about the same period, in a single province in Quito, it is related, it destroyed upward of 100,000 Indians. In Russia, according to the calculation of Dr. Alexander Creighton, physician to the Emperor in 1812, every seventh child died annually of the small-pox; and Colon set down the deaths in France as from 60,000 to 72,000 annually. This was before vaccination. The periodicity which existed in the pre-Jennerian times is interesting as showing that an epidemic of the disease caused an immunity among those attacked who were fortunate enough to live, for a certain period of time, and there is a relationship between this thought and vaccination as practised at the present day. This periodicity differed in different localities. The immunity seemed to be exhausted sooner in some places than in others, and may this not be true in regard to vaccination? Small-pox first made its appearance in the United States in Boston in 1649, and from then to 1792, about one year in twelve, it was epidemic, while in Vienna from 1742 to 1759 it was epidemic about every fourth year. The enormous mortality from the different epidemics in this country are too familiar to you all for me to quote, and the mode of transmission is also well-known. The great prophylactic power of vaccination in small-pox has been so thoroughly demonstrated in our present outbreak that it does not seem possible that the opponents of vaccination have a single thread to hang on. For a time being, after the disease exists, with the large amount of vaccination that has been done, small-pox will decline until the immunity is lost by time and the future generation comes up unprotected, then we will have a repetition of the disease. To prevent a prevalence of small-pox is a work difficult to perform, for as I stated before, the great masses of the people will only learn by experience. We are, however, very much better off than our forefathers in respect to knowledge pertaining to the greater epidemics. We now know some of the potent factors which cause certain diseases that are or may be classed as epidemic. While the people are slow to realize the invaluable scientific discoveries that have been made concerning epidemic diseases within the past two or three decades, the more intelligent portion is beginning to understand more and more their value, and the medical profession may feel encouraged with the progress made.

ON THE LOWERING OF THE GENERAL DEATH-RATE.*

By Sir Joseph Ewart, M.D., F.R. C.P. Lond.

In my opening address I propose, as briefly as may be, to call particular attention to some facts demonstrating the lowering of the general death-rate, the diminution of the mortality from some special diseases, and the disappearance of, or great reduction of deaths from certain diseases.

1. Thus, during the three years 1858–60 and the seven succeeding quinquennial periods ending with that of 1891–95, the death rate per 1,000 from all causes amounted to 22.22, 22.58, 21.96, 20.79, 19.40, 18.90, and 19.04 respectively. This reduction, with a concurrent increase of the health and happiness of the people, is apparent enough. That it has not been greater may be ascribed to several recurrent epidemics of influenza during the last quinquennium.

The decrease in the proportion of deaths is more developed in urban than in rural districts. Thus, in 1861–70 it comes out that for every 100 deaths in the counties there were 126 in the towns; but in 1891–93 the comparative proportion stood as 100 to 113. This satisfactory result, it may be fairly assumed, was due to the infusion of greater energy and activity into the work of dealing with the slums; houses unfit for human habitation, unhealthy and condemned areas, dilapidated pavements, the scavenging and maintenance of streets, dust and refuse, general and domestic drainage, the cleanliness, ventilation, and lighting of the home, the drinking water and food supply in urban districts. Should this rate of progress be maintained, the disproportion in the number of deaths still debited against urban districts might be wiped out in the near future. Will this indication of advancement be sustained? It may certainly be so if the parish, district, and county authorities are not too sluggish in recognizing the necessity of carrying out the sanitary laws, especially in placing the drinking water of the people beyond the risk of dangerous pollution. If, however, the Public Health Acts as well as the Food and Drugs Acts are vigorously administered and enforced, there is not much chance of the rural districts being worsted in the competition. It will be noted that the comparison covers a period characterized by the advanced elementary education of the children of the people in England and Wales. It is said that primary education is not so thoroughly conveyed in rural as it is in urban districts. If this be so, in the matter of sanitation the country stands at a disadvantage; but with equality in this respect, there will be equality of the power and capacity on the part of the people to avail themselves of all measures calculated to raise the standard of health and prevent avoidable disease, which must tell in ameliorating the public health.

2. Here it may be useful to pass in review the change that has taken place in the mortality from some special diseases.

(a) Thus, in the three years, 1858–60, the death-rate per million from small-pox was 219, whilst in the corresponding period of 1891–93 it had diminished to 22.

(b) In the same periods, the rate from the group of fevers, including enteric, typhus, and some ill-defined forms of continued fever diminished from 792 to 191 per million of population.

(c) In 1871–75 typhoid or entetric fever had a death-rate of 373.8 per million, which sank to 135.2 in 1891–94.

In its initiation and etiology, its association with sewage has been well established. The bacillus gains access to the blood through contaminated water, milk, oysters, mussels, and other forms of shell-fish. The greater care now being taken in the provision of a pure water and milk supply throughout the country has already been attended, as the preceding figures show, with very favorable results. Doubtless still further improvement would follow if both milk and water used for human consumption were regularly boiled beforehand.

---

* An address before the British Med. Assn. and pub. in British Med. Journ.

For some time physicians and medical officers of health have been puzzled to account for the origin of cases of typhoid fever in persons consuming wholesome milk and drinking water and occupying houses free from any discoverable insanitary surroundings. Attention has naturally been directed of late in such cases to the shell-fish food supply prepared in sewage poisoned water. Over and over again it has been observed that one or more members of a family have been stricken down by typhoid fever whilst the water and milk consumed and the house drainage were all quite unimpeachable; but, on careful and exhaustive inquiry, it has been found that the said member or members of the family had been the only one or ones to partake of oysters derived from ponds or beds saturated with sewage at a time when that has been known to be mixed with the dejecta from cases of typhoid fever occurring in the neighborhood. It is understood that a Local Government Board inquiry is now being made into this matter. Should the result of this investigation go to confirm the opinion entertained regarding shell-fish, prepared for the market in sewage contaminated water, being the cause of much of the enteric fever found in this country, additional legislation will be required for the protection of the public health.

What will be wanted will not be the destruction of shell-fish as an article of diet, but the purification of the medium in which they are reared and cultivated, or such an amendment in the Public Health Act as will empower local authorities to prevent the use of sewage—carrying the dejecta from patients passing through an attack of typhoid fever—in the feeding of shell-fish. To make this effective, the health authorities will have to be armed with the same powers as they now possess regarding suspected milk. Nothing short of this will suffice.

In this connection I quote the following unique experience: In 1894, after an exhaustive inquiry, it was found that out of 56 cases of typhoid fever, 22 cases, or nearly "40 per cent., were ascribed to sewage contaminated shell-fish." In 1895 the result of the investigation was that out of 56 cases of typhoid fever there were 7 cases in which the attack was "directly ascribable to oysters, and 12 cases due to other shell-fish eaten raw," or 34 per cent.

> The evidence connecting these 19 cases with the consumption of raw sewage shell-fish did not consist simply in the fact that shell-fish had been consumed within three weeks before the date of the onset of the disease. Such an order of events, occurring in a rapid succession of cases, would have served to justify a serious suspicion that the shell-fish were connected with the typhoid fever in the relationship of cause and effect rather than accidentally. The facts when investigated in detail were much more conclusive, comprising as they did the significant circumstances that in the majority of cases either *(a)* the one person taking the shell-fish was the one person acquiring typhoid fever; or *(b)* when other persons in the same house had eaten shell-fish they had diarrhœa or other evidence of illness, although this did not develop into actual typhoid fever. When it is added that the beds from which the oysters and mussels came were obviously contaminated by sewage to a gross extent, and that sewage-derived organisms were found in the interior of oysters derived from the same beds, the evidence becomes as strong as it can in the nature of things be in a medical inquiry concerned with circumstances of life necessarily complex in character.

(d) Typhus fever in 1871–75 yielded a death-rate of 81.4 per million, which fell to two million in 1891–94. This fever is, in its causation, associated with extreme overcrowding, and has almost been extinguished, except in a few large towns. So seldom is this contagious form of fever now met with that, in a first case, its diagnosis has been known to be overlooked until a consequent isolated outbreak has attracted attention to its real nature. Doubtless, as the fever dens and slums become altogether replaced by well-lighted, well-ventilated, and self-contained habitations, the mortality from this disease will become a thing of the past.

(e) Phthisis gave in 1858–60 a death-rate per million amounting to 2,565, which in 1891–93 sank to 1,512, a reduction of 41 per cent. The diminution of the deaths from phthisis is as significant as it is satisfactory. Unchecked it has (and is still in a much mitigated degree) been the means of cutting off large numbers of the most promising young members of the population. We are now, however, beginning to realize the fact that this decrease in the mortality from phthisis points to the ameliorating influence of healthier and better ventilated homes; more wholesome and more efficient feeding, and a higher standard of domestic hygiene; general comfort and prosperity enjoyed especially by the industrial classes. Further prevention is practicable by the constant collection of the sputa in a spittoon and the thorough disinfection of its contents by a strong solution of carbolic acid or corrosive sublimate, and their subsequent incineration. The disuse of pocket handkerchiefs must also be commended. The avoidance of uncooked or imperfectly cooked milk or meat derived from animals affected with tuberculous disease cannot be too strongly urged as a prophylactic measure of primary importance.

(f) Other tuberculous diseases, in which are grouped scrofula, tabes mesenterica, tuberculous meningitis, and consumption of the bowels, furnished a death-rate in 1858–60 of 739 per million, and as much as 682 in 1891–93, demonstrating a decrement of only 8 per cent. As there is valid reason for believing that the specific bacillus of the various forms of tuberculous disease gains access to the system, first, by the inhalation of dust proceeding from the dried expectoration of consumptive patients, or, secondly, by being swallowed with food derived from tuberculous animals, the complete disinfection of the sputa, absolute cleanliness of sick patients' rooms, and thorough cooking of tuberculous meat and milk are necessary to destroy the bacillus and prevent the spread of the infection to others.

Much light has been thrown on the subject of tuberculous disease by the researches and experiments of Drs. Martin and Woodhead made for the information and guidance of "the Royal Commission appointed to inquire into the effects of Food derived from Tuberculous Animals on Human Health." Dr. Martin declares that the milk of cows affected with tubercle of the udder possesses a virulence which can only be described as extraordinary. "All the animals inoculated with infected milk showed tuberculosis in its most rapid form." Dr. Woodhead reports as follows: "A most important point is that the spread of tubercle of the udder goes on with most alarming rapidity; this I was able to observe in cows constantly under observation, but I have also noticed on several occasions during the interval between the fortnightly inspections carried on along with a veterinary surgeon, that the disease has become distinctly developed. It may be, of course, that the early evidence has been overlooked at the previous inspection, but whether this is the case or not, the spread of the disease was so rapid as to afford very good ground for alarm. The very absence of any definite sign in the earlier stage is one of the greatest dangers of this condition." Both Drs. Martin and Woodhead insist that no tuberculous animal of any kind should ever be allowed to remain in a dairy. I note that in France, to prevent the spread or development of tubercle among dairy cows in towns, the animals are fattened and killed after sufficient time has elapsed to exhaust the milk after the first and only calf. Happily milk infected from tuberculous udders can be rendered wholesome "by boiling for an instant." Mere warming is not sufficient. The universal adoption of the precaution of simply raising the temperature of infected milk to the boiling point before being used, would materially lessen the development of consumption of the bowels so common among infants, tabes mesenterica, scrofula, and hydrocephalus.

What is the influence of cooking upon tuberculous meat? Not having at hand actual meat substance known to contain tuberculous matter within its interior, Dr. Woodhead "prepared some specimens artificially, sometimes by injecting tuberculous stuff to a known depth into a joint, sometimes by smearing such matter on slices of meat, and forming the whole into a compact mass. Such masses, without intentional pollution, are known to butchers as 'rolls' of meat. By means of test experiments Dr. Woodhead arrived at the conclusion that "in the boiling and roasting experiments, as ordinarily carried out in the kitchen, the temperature, however high it may be near the surface, seldom reaches 140° F. in the center of a joint, except in the case of joints under 6 lbs. in weight. Ordinary cooking is quite sufficient to destroy any smeared material that remains on the outer surface of the meat, but it cannot be relied upon in the slightest degree to render innocuous the same smeared material when in the centre of a roll." Dr. Woodhead was careful to call special attention to these "rolls." He had prepared them artificially for experimental purposes. Accidental imitations of them by a careless and slovenly butcher by smearing slices of his rolls with material derived from tuberculous glands or, it may be, by including some infected membrane in his roll "would probably form the maximum of danger to meat consumers." We have already been told that ordinary cooking does not raise the temperature sufficiently high in the central parts of these rolls to effectually destroy the tuberculous matter. In this connection Dr. Woodhead draws attention to "the use of raw meat juice as a special form of food for delicate children." Care should, of course, be taken that this useful article of diet for sickly children should be prepared from meat free from tuberculous contamination.

The contamination of meat substance from organs of the same or other animals by the "hands, knives and clothes of a butcher" who has been handling the tuberculous parts of a tuberculous animal during the process of "flaying and dressing" is a substantial danger.

When, a few years ago, tuberculin was first discovered by Professor Koch, it was suggested that it might be employed with success as a cure for consumption. This promise has not been sustained by subsequent experience. Although it has been proved to be a failure as a therapeutic agent, hope is entertained that it may possibly be used as a valuable diagnostic test. On the Continent it is reported that it has been applied with success. Should this be confirmed by further trials, and we are so provided with the means of eliminating animals infected with tuberculous disease from a given herd, the sanitarian will thus be armed with a preventive agent of superlative importance.

(g) It does not seem that diphtheria has been diminished by hygienic or sanitary measures. Indeed, until this year, it appears to have been steadily on the increase. Measles, whooping-cough and influenza are equally untouched by them. The same may be said of summer diarrhœa, which, though probably of microbic origin, may be viewed as, in some degree, a social as well as a sanitary question.

3. A brief consideration of some diseases which have either disappeared or been greatly reduced, will next claim attention. These are object lessons of primary importance, giving encouragement to the officers of health and inspiring them with the hope that what has occurred with reference to these may happen, in due course, not only to almost all the existing zymotic affections, but to many others at present excluded from the authorized list of notifiable diseases.

(a) Malaria and Malarial Fevers.—When a tropical or subtropical country is described as unhealthy it may almost always be regarded as malarious. The various forms of malarious fever in former times prevailed extensively in this country! Except in imported cases, they are now almost unknown. How have they become extinguished? The answer is by the extension of the cultivation of the soil and effective drainage. The bacilli causing the various types of malarious fevers, believed by some to be conveyed by mosquitoes, do not thrive

under these improved conditions. Much of the improvement of the public health in the cities of Bombay, Madras and Calcutta, is doubtless due to better drainage and cultivation of the surrounding districts. Something of this advance must be ascribed to the better drainage, sewerage, and water supply of these localities, all of which contribute to raise the standard of the general health of the community.

(b) Scurvy.—This was formerly the scourge of the navies and mercantile services of all nations. It also prevailed extensively in armies and communities on land. It has now almost entirely disappeared from the United Kingdom and our now non-malarious colonies and dependencies. Captain Cook was the first to demonstrate the potency of fresh vegetables in preventing scurvy among his crew. It is on record that he conducted an expedition of 118 men round the world, and returned with a loss of only one man after an absence of three years. On the other hand, the fleet commanded by Admiral Anson, in nine months of 1742, fed on the usual restricted dietary, suffered a loss of 626 out of a total strength of 961 men. The Irish famine of 1847 was accompanied and followed by a widely spread outbreak of scurvy, rightly ascribed to deprivation of the starving people of their principal vegetable—the potato. A similar result has been observed in the Orissa and other Indian famines. In the early days of the Crimean war, it is said, the French lost more men by scurvy, than by "the guns of the enemy." Dr. Barlow has recorded some cases of the disease in infants fed on preserved provisions. It should be borne in mind that scurvy may be reproduced, "in a mild or severe, an intermittent or endemic form in any latitude, in any country, or among any variety of the human race"[1] by the resuscitation of those circumstances and conditions by means of which it has always been engendered in individuals, bodies of men, and communities on sea and land. Such a reproduction is guarded against in the Royal Navy by the daily distribution of lime or lemon juice in addition to a varied dietary of fresh vegetable and animal food; a thoroughly antiscorbutic dietary is also secured to the long voyaye ships of mercantile marine by legislative enactment. The general result is a glorious prophylactic triumph all along the line.

(c) Leprosy.—This loathsome and incurable disease, it is said, "was brought to England" sixty years before Christ (Parton). It existed in Egypt in the reign of Husapti at least 3,000 years before the commencement of the Christian era (Newman). It has prevailed from the earliest times in China, India, Arabia, Africa, Oceanic Indica, Polynesia. It is now endemic in all these regions, and also in Norway, Sweden and Iceland. We found it among the Maoris of New Zealand, but it is undergoing rapid extinction throughout that island. For more than thirteen centuries it was endemic in Great Britain and Ireland. Between the eleventh and twelfth centuries no fewer than 200 hospitals were specially erected for the accommodation of lepers. This was "due, it is believed, to the awakening of humanitarian ideas, or to some rough ecclesiastical intention of thereby preventing its spread" (Newman). Durham, Bolton, and Carlisle each had an institution of this kind, providing for 65, 13, and 13 lepers respectively. The zenith of its prevalence in this country was reached in the twelfth century; it became extinct in the eighteenth century.

In mediæval England, Ireland and Scotland, the food of the people consisted of stale salted meat and fish—often semi-putrid—and black rye-bread, without fresh vegetables. In towns, villages, and mud-built hamlets, all sorts of filth was thrown outside the homes of the people, and there it remained. In 1349 a proclamation was issued to the citizens of London, commanding: "That no person whatever should presume to lay any dung, guts, garbage, offal, or any other ordure, in any street, ditch, river, etc., upon a penalty of £20" (Rees). The homes of the people were wooden or mud houses, without drainage or ventilation (Fayrer). The floors of earth or clay were covered with rushes, straw, and other rubbish, which were occasionally renewed; but underneath lay unmolested an ancient collection of beer, grease, fragments of fish, spittle, the excrements of dogs and cats, and everything that is nasty (Erasmus). Close by the door there was the "mixen," a collection of every abomination, and streams of filth polluted the houses and neighborhood, including any river at hand (Rogers).

Under such conditions of diet and insanitation, plague, pestilence, and famine ruled periodically throughout the length and breadth of the land. It is probable that the famine of 1315-1316, and the Black Death of 1349, between them carried off more than half the population of the country.

These, with the Great Plague of 1665, played an important part in the extermination of leprosy. As the food of the people was improved by the introduction of gardens (1309), and the extended cultivation of the soil, and better houses were provided with corresponding sanitary surroundings, the disease gradually disappeared.

It was long believed that leprosy was spread by contagion. That it is communicable may be inferred from the discovery of a specific bacillus by Hansen. It spreads rather in this way than by contagion. Neither in ancient times, in our own land, nor at the present time in those countries where the disease is still endemic, has there ever been any real or effective segregation or isolation. If, as can scarcely be imagined, a relapse into those physical, social, and insanitary conditions which existed in the Middle Ages could take place—conditions which exist in those countries where leprosy is still endemic, then its revival would be favored even in these islands.

(d) Plague.—It is believed that this terrible pestilence had been endemic in Egypt and Syria two or three centuries before the Christian era. In the sixth century it suddenly traveled from Egypt into the adjacent provinces of Asia and Africa, and also invaded the whole of Europe, causing frightful mortality. The climax of its prevalence—the social and physical condition of the people being at its lowest ebb—was attained during mediæval times. It has been noted that in line with the advancing improvement of the community epidemics of the pest recurred at extended intervals. Still, there did not seem to be any diminution of its severity. This was exemplified in the Great Plague of London in 1665, of Marseilles in 1720, that of Morocco in 1770, and elsewhere in the eighteenth century. It is curious to note that these outbreaks in London and Marseilles were the precursors of the extinction of plague in France and England. True bubonic plague occurred, however, during the eighth decade of the current century in Arabia, and on the Volga. During the past two years it has raged, in a very mortal form, at Hong Kong, spreading even now slowly but steadily in Southern China, where, in the towns, the filth, overcrowding, physical and social habits of the people are, in many respects, as bad as they were in this country in the Middle Ages.

(e) Black Death.—In the fourteenth century, apparently originating in Northern China, this highly contagious malady devastated the world. What was it? Some authorities consider that it was a form of plague. It seems to me that it was probably typhus fever modified and intensified by the low state of general health produced by insanitary conditions and habits so evil as to defy accurate description.

(f) Cholera.—Although our shores have, on three distinct occasions in recent years, been invaded by cases of this epidemic in its traveling and mortal form, it has not been able to spread to any material extent. Why? Because every possible precaution is now taken by our municipalities to secure the water supply of our seaports from contamination with the cholera bacillus. This finds a congenial home in sewage, cesspools, and in shell-fish. In this country its access to the drinking water of the people is happily becoming more and more impracticable. Mr. Ernest Hart has done yeoman's service in the cause of preventive medicine in his

able address to this Section, at our last meeting in London, in insisting that cholera is mainly diffused through the medium of a vitiated water supply, and by pointing out that the best way to meet an invasion is, in addition to cleanliness in all things, the use of pure drinking water, and by emphasising the necessity of doubling the security by having such water boiled before being employed.

Whether we consider the gradual decrement of the mortality from all causes or from special diseases, or the disappearance or great reduction of the death-rate resulting from certain diseases briefly reviewed in this communication, there is room for much satisfaction. The great facts of the sanitary history of the remote and recent past give hope for continued progress and improvement in the future. The absolute reduction of some diseases and the gradual reduction in the destructiveness of others stand forth as object lessons for the guidance and encouragement of the medical officer of health as well as the sanitary engineer. The evolution has been proceeding for centuries, with a more quickened pace and success during the Victorian era than in all the centuries before put together. Though much good has been accomplished, still more remains to be done. Of course, the warfare against the so-called zymotic diseases will be continued with unabated activity. It would, however, be advantageous to extend the field of operations, so that the pioneers of preventive medicine might be enabled to deal with other diseases equally important. Zymotic diseases in 1893 "caused a death-rate of 3,165 per million living." Tuberculous diseases accounted for a death-rate of 3,192 per million in the same year. The annihilation of these diseases, like that of the allied disease leprosy, would have brought the mortality of 1893 down from 19.17 to 16.02 per 1,000.

Bronchitis and pneumonia were responsible for a death-rate of 3,192 per million. A very large amount of this mortality is caused by improper conditions of housing, clothing or work, and is preventable. Then rheumatism may be cited as a disease the mortality from which is probably much understated at 433 per million. Indeed, in its acute and chronic phases it must be regarded as one of the greatest enemies of mankind. Why should not these—and I might include others—be included in the list of notifiable diseases? Indeed, the time is coming when, with the exception of old age and minor ailments, every serious disease should be included in the domain of preventive medicine.

Apart from the zymotic diseases, the three great enemies of the human race are tuberculosis, malaria, and rheumatic fever. As regards *(a)* tuberculosis, we are already acquainted with our enemy, and know how to meet it with increasing success in the future. *(b)* Malaria has been practically extinguished in these islands; but it is our worst foe in the low-lying lands of tropical and tropoidal countries. It is this more than anything else which lies at the foundation of the inability of the European race to colonise such regons. Our experience at home—applied on a sufficiently complete scale—is the only remedy, namely, efficient drainage and cultivation of the soil. It is, therefore, largely a question of time, money and enlightened and progressive civilization. In malarious India, which is as large as Europe, excluding Russia, the evolution is advancing on the right lines, but he would be a bold man who would venture to guess the number of centuries that will be occupied before the same immunity will be accomplished there as is now exemplified in Great Britain and Ireland, and in the colonizable possessions of Canada, Australia, and New Zealand. With respect to *(c)* rheumatic fever, it is apparent enough that the returns of the Registrar-General do not expose the ravages committed by it in their entirety. It is one of our most formidable enemies. It is tolerably certain that it will soon have to be transferred from the list of constitutional to that of specific febrile diseases. On this point overwhelming cumulative evidence has been adduced in the Milroy Lectures of 1895 by Dr. Newsholme, the distinguished medical officer of health at Brighton. Dr. Newsholme shows that rheumatic fever occurs in distinct outbreaks at intervals of a few years, and that both in this country and in the European and American continents these epidemics are very marked. The occurrences of these epidemic periods never occur in years marked by much rain, but only in dry years, and particularly when there has been a succession of dry years. This is explained by Dr. Newsholme by the hypothesis that the micro-organism of rheumatic fever finds the conditions necessary for its subterranean existence in a dry and comparatively warm subsoil. In towns in which the point could be tested the epidemics of rheumatic fever always corresponded with a low subsoil water and a subsoil temperature abnormally high. These observations completely controvert the old-established and deep-rooted notion that rheumatism is associated in its origin with "damp." This is a good instance of the not infrequent fallacy of general notions. No doubt it originated in the fact that with changes of weather twinges of pain are often experienced by some neurotic people, and it was erroneously assumed that these were rheumatic in their character and pathology.

My design has been, so far as the restricted limits of an address has permitted, to portray the marvellous reduction of the mortality in general from all causes, and also from some diseases still prevailing in a mitigated degree, as well as the more or less complete extinction of other maladies which formerly decimated the inhabitants of these islands. A review of the retrospect justifies the entertainment of a hopeful and encouraging prospect. The experience already gained clearly indicates that the time is approaching when typhoid fever, consumption, scarlet fever, and many other diseases will be prevented with as much success as has attended the warfare against typhus fever; scurvy, plague, leprosy, malarious fever, and cholera, etc. It is this knowledge of our past sanitary history—pointing to other and even greater conquests looming in the not very distant future—that tempts me, in conclusion, to say a few words on the organization of the scientific machinery engaged in carrying on the campaign, especially against those diseases which are known to be the most unrelenting foes to the enjoyment of health, happiness, and longevity.

It is admitted by all who are competent to form a reliable judgment on the case, that the existing uncertainty in the tenure of office by many health officers and inspectors of nuisances is decidedly injurious to the preservation and conservation of the public health. The practice of making appointments on a system involving annual, biennial, triennial, quadrennial, quinquennial re-elections is a monstrous injustice to officers engaged in the execution of functions eminently judicial in character. The system is calculated to handicap independence and integrity, to obstruct and stifle sanitary progress. It is vitally important that, in carrying out their duties fearlessly, fairly, honestly and honorably, with the single object in view of promoting the best interests of the public, the health officer and inspector of nuisances should be guaranteed against injustice to themselves. Security against such injustice has been granted to the health officers of London, and also in the provinces, in all cases where the local government board is responsible for the payment of half his salary; but in a considerable proportion of the appointments in rural and small urban districts this is not so.

The remedy for this state of things was ably set forth by an influential and representative deputation which waited upon Sir Walter Foster, M. P., on March 9th, 1895. The spokesmen were Dr. Farquharson, M. P., Dr. Armstrong, Dr. Ward Cousins, Professor Smith, Dr. Vacher, and Earl Fortescue. His lordship laid before Sir Walter the following resolution passed by the Incorporated Society of Medical Officers of Health and the Sanitary Institute respectively:

> That in the opinion of this Society (Incorporated Society of Medical Officers of Health) it is detrimental to the best interests of the public health,

and the efficient carrying out of the laws relating thereto, that medical officers of health should be appointed for limited periods, and on a precarious tenure of office. That it is desirable that similar provisions to those of the Public Health (London) Act, 1891, Section CVIII (1), (2), *b* and *c*, should apply to all medical officers of health in England and Wales.

This meeting (Sanitary Institute Congress) is of opinion that in the interests of the public health of the country, it is no longer expedient that appointments as medical officers of health and inspectors of nuisances should be made for limited periods of time. It is desirable that the powers of the Local Government Boards with regard to these should be extended so as to apply equally to all medical officers of health and inspectors of nuisances, whether they be paid entirely out of rates or not.

THE INDIGESTION OF BREAST BABIES.*

THE August number of the *Edinburgh Medical Journal* contains an article by Dr. James Carmichael, who says that, for many reasons, less attention has been paid to the gastro-intestinal affections met with in breast babies than in those nursed artificially. Breast milk is the natural, and ought to be the sole food of the infant, under physiological conditions, during the first year of life.

In inquiring into the causes of indigestion in breast babies, it may be assumed that, in a healthy child nursed by a healthy mother, it rarely, if ever, occurs. The conditions which lead to a departure from normal conditions, and which injuriously affect the child, are numerous. A certain group of causes which may affect both mother and child simultaneously are defective hygienic conditions generally, such as unhealthy, low-lying, and damp dwelling houses, noxious effluvia from drains, or malarial poison. Under such circumstances both mother and child are apt to suffer, unless removed from the injurious influences. As it is to the mother specially that we have to look when the child suffers, any departure from normal health is apt to affect her milk supply.

Whenever the milk of the mother is defective in quantity or quality, the child is apt to suffer. It does not thrive or grow at the normal rate. Instead of being plump and firm and happy, it is soft and flabby, and is always crying, and never appears to be satisfied. Its skin is harsh and dry. The tongue is somewhat red, often slightly furred. Vomiting is not infrequent from gastric catarrh. The stools are unnatural, and present various appearances depending on the quality of the milk. They are generally loose, and seldom have the natural mustard color or consistence; but are usually pale, and often of an ashy gray color, sometimes greenish, or mixed gray and green. The soft curd of the mother's milk is present, undigested, in little granular-looking masses. There is an excess of mucous secretion, sometimes little streaks of blood. As a rule, the indigestion of mother's milk is more frequently intestinal than gastric, diarrhœa being more common than vomiting. This, says the author, appears to be largely due to indigestion of the fatty and proteid elements of the milk. Infants, in regard to their digestive capabilities, are but little men and women, and it is certain they have their idiosyncrasies likewise. The milk of a mother seems to be suited to her own child under physiological conditions. It has been proved over and over again that a child who is thriving on its own mother's milk if put to another may suffer, even although the woman is healthy and her milk is found on analysis to be of good quality. This is one of Nature's mysteries which it is difficult to explain, he says, but yet remains as a fact demonstrated by observation and experiment. It shows how subtle and delicate the nutritional relations are between mother and child. If this is so in natural feeding, it helps to explain the difficulties which are encountered when the child is artificially reared.

With regard to the management of indigestion generally, it is well to ascertain the cause, and look to the mother and her habits. The breasts, the milk, and the evacuations of the child should be carefully examined. In this way a conclusion as to the cause of the indigestion in the greater majority of cases may be reached. If there is any disease, functional or organic, of a persistent nature, the case must be considered in all its bearings, and a decision come to as to the possibility of continuing lactation with any prospect of success.

---

* *New York Medical Journal.*

The occurrence of menstruation requires careful consideration in regard to nursing. Analyses show that during the menstrual period the milk is deteriorated in quality, and gives rise to more or less disturbance, often of a trivial nature, in the child. On the cessation of the menstrual flow there is generally a return to normal conditions as regards the quality of the milk, so that menstruation in most cases is not a bar to nursing. It may come on a few months after lactation has commenced, and not recur for several months, so it is undesirable to wean the baby if it can be avoided on the occurrence of the first menstruation. It is a very different matter when *pregnancy* occurs. In this case it is necessary and desirable that the child should be weaned.

The diet and regimen of the mother during lacation is of the first importance. It must be borne in mind, continues the author, that the whole process is a physiological one, and that a healthy mother requires really no special treatment during the nursing period. She ought to take her usual food, a plain mixed dietary, and have a due amount of open-air exercise. A good nurse generally has an excellent appetite and digestion, and is usually able and ought to eat a somewhat larger quantity of food than at other times, and probably a shorter interval between meals may be advisable. She should have a late meal, and in the early morning some soup, or a glass of milk or cocoa and a biscuit, or bread and butter. It is desirable that a mother in good average health should fulfill the maternal duty of nursing her child if possible. Many mothers are too apt to seize the opportunity, if anything is wrong, to give up nursing, and in this they are often influenced by the father, who ought to be out of court in such matters. Medical practitioners are apt in many cases to give in to the wishes of the parents in this respect instead of encouraging the mother to nurse her child, and counseling patience and rational treatment with a view to improve the milk supply. Dr. Ballantyne considers it the physician's duty to encourage mothers to nurse their children if there is no distinct contraindication. Inquiry must be made into the habits and hygienic conditions under which the mother is living. The milk must be examined, and will not fail to give valuable information. If it is deficient generally in quantity, he says, endeavor to inspire hope in the mother that she may yet be able to nurse her child ; and if her appetite and digestion are good, advise her to take an increased quantity of the lighter and more quickly digested nutriments, with plenty of liquid. If she has too much milk, the fluids must be reduced and the solids increased. Irregular suckling must be prohibited, as a common cause of indigestion in the infant. If chemical examination of the milk shows increase or diminution of the proteids, fat, or solids generally, prescribe accordingly. To increase the solids, give the child the breast more frequently, prevent the mother from overexerting herself, and do not let her drink too much. To decrease the solids, order longer intervals between the nursings, more exercise, and a larger amount of fluid nutriment. Increase of fat indicates the need of less animal food in the dietary. Diminution of fat requires a larger quantity of animal food. The most certain way of regulating the amount of proteids is by muscular exercise, allowing plenty of exercise if the amount of proteids is too large, and decreasing the amount of exercise if they are deficient.

Department of Physiological Chemistry.

WITH SPECIAL REFERENCE TO DIETETICS AND NUTRITION IN GENERAL.

Edited by J. HOBART EGBERT, A.M., M.D., Ph.D.

STARCH; ITS DIGESTION AND VALUE AS A NUTRIMENT.

THAT starch is an important alimentary article is evident from the fact that about two-thirds of the solid food of mankind consists of starch. Starch is derived exclusively from the vegetable kingdom, and occurs in vegetable tissue in the form of little granular bodies of regular construction—the so-called "starch-granules." Owing to the existence of a containing envelope, the starch-granule in its original raw state is difficult of digestion, and when thus taken into the system is largely passed unchanged with the undigested residue from the alimentary canal. Boiling, or otherwise exposing to due heat, ruptures the granules and renders the starch easy of digestion and transformation into absorbable material. Farinaceous and other foods rich in starch require, therefore, to be cooked before being consumed by man. But starch *per se* is neither soluble in the water of the digestive fluids nor capable of absorption by the blood for the nourishment of the body. A change is necessary, and this change begins with the very first step of digestion—in the mouth. Here, by the action of the ptyalin of the saliva, starch is converted into diffusible maltose ($C_{12}\ H_{22}\ O_{11}$), a sugar which differs from grape sugar ($C_6\ H_{12}\ O_6$) in that it has less sweetening power, less readily reduces cupric oxide, but exercises more rotatory power on polarized light. The starch molecule is probably 10 ($C_{12}\ H_{20}\ O_{10}$), and the final result of the salivary digestion may be represented as follows:

$$\underset{\text{Soluble starch.}}{10\ (C_{12}\ H_{20}\ O_{10})} + \underset{\text{Water}}{8\ H_2\ O} =$$

$$\underset{\text{Maltose.}}{8\ (C_{12}\ H_{22}\ O_{11})} + \underset{\text{Dextrin.}}{4\ (C_6\ H_{10}\ O_5)}$$

In the stomach the digestion of starch is discontinued—the gastric juice having no diastatic ferment and its acid nature preventing further action of the ptyalin—but in the small intestine it recommences, the diastase of the pancreatic juice readily changing cooked starch into dextrin and sugar; while the succus entericus secreted by the glands of the small intestine contains a ferment called invertin, which further changes cane-sugar into invert-sugar, and thus, now rendered thoroughly diffusible and quite robbed of its identity, starch enters the portal vein and is conveyed to the liver. Here, as glycogen, a portion is stored up as fuel to feed the furnaces of the body and thus, by oxidation, yield heat and muscular energy; while another portion is further transformed into fat. Being devoid of nitrogen, starch contributes only toward force and fat production, and is in no sense a tissue food. But amyloid and saccharine substances are fuel from which the body generates vital force and animal heat.

Sago, tapioca, cassava, arrowroot and allied farinaceous products are representative starchy foods. Consisting, as they do, either entirely or almost so of pure starch, they have no alimentary value beyond that possessed by this principle. They are, however, agreeable, light and easy of digestion, and are serviceable as accessory articles of diet for both the sick and healthy. Sago and tapioca are usually employed in the form of pudding or added to soups and broths; arrowroot may be made into gruel, pudding, blanc mange, or biscuit.

The cereals are rich in starch. According to Payen the percentage of starch in the various cereal grains in a dry state is as follows: Venezuelian hard wheat, 58.62; African hard wheat, 65.07; rye, 64.65; barley, 66.43; oats, 60.59; maize or corn meal, 67.55; rice, 88.65. Rice, which is particularly rich in starch, is poor in nitrogenous matter, fatty matter and salts; while cornmeal contains a fair proportion of both starch and nitrogenous matter, and is notable for its richness in fatty matter.

According to Payen the percentage of starch in the common leguminous seeds is as follows: Broad or Windsor beans, 55.85; kidney beans, 55.70; dried peas, 58.70; lentils, 56.00.

Tubers and roots contain a fair percentage of starch. Aside from its 74% of water the potato is mainly starch. The sweet potato, turnip, carrot, parsnip and beet contain both starch and sugar. Ripe fruits usually contain sugar and not starch.

That starch is transformed into fat within the body has been conclusively demonstrated by Liebig, Boussingault, Playfair and others. Pigs fed on potatoes (which according to Payen contain but eleven hundreths of one per cent. of fat) fatten readily and the fat accumulated greatly exceeds the fat taken in with the food. A cow fed on potatoes and hay gives for more fat in the milk than is contained in its diet, to say nothing of fatty substances excreted with the egesta, and which Liebig estimated to represent a fair proportion of all the fatty matter consumed in the ingesta. These observations plainly show that foods rich in starch and sugar should be used sparingly by the obese.

THE RELIEF OF CONSTIPATION BY ATTENTION TO DIET AND HYGIENE.

Constipation is a condition of such universal occurrence and a disorder which is usually treated not only with indifferent success but with such careless disregard for the laws of physiology and hygiene that its consideration here seems most proper. While there are persons whose bowels act only once in two or three days and whose health continues unimpaired, it is safest to follow the recognized rule and aim at the daily evacuation of the bowels. The accumulation of waste material in the large intestine for a longer period of time than twenty-four hours frequently leads to local irritation, to the absorption of effete matter through the walls of the intestines, and the general daming up of digestive, excretory and nutritive processes with consequent nervous depression and general vital debility.

Constipation can seldom be cured by drugs, although laxative or purgative medicines may sometimes be required for its immediate relief. The habitual use of laxative and cathartic drugs is productive of far greater harm than most people imagine, and yet the general domestic use of "cathartic pills," "laxative syrups," "anti-costive powders," "cordials," etc., is almost universal. Almost all such medicines are intestinal stimulants, nothing more, and the victim of such habit should ever bear in mind that stimulation begets reaction and increased debility as certainly as night follows day. Here as elsewhere patients desire such remedies as best suit their convenience and inclination and thus endeavor to substitute the temporary relief to be derived from the use of nauseating and debilitating drugs for the absolute benefits to be secured by proper living and measures which yield increased health and vigor.

Negligence may have much to do with the occurrence of constipation. The calls of Nature should be obeyed, and when the natural tendency to evacuation of the bowels occurs there should be voluntary response on the part of the individual. Habit has its influence, and the repairing to the closet with regularity is a duty incumbent upon all, but particularly those who are prone to constipation. If the habit of regularity of defecation is neglected, all measures instituted for the relief of chronic constipation are likely to fall short.

It is well-known that sedentary habits conduce to inactivity of the bowels. Exercise is the proper remedy, and while variety of exercise is requisite it should include such efforts as call the abdominal muscles into definite action—as walking, riding the bicycle, horse-back riding, tennis, etc. Loss of muscular tone to the intestinal walls is a frequent cause of chronic constipation. This may result from chronic intestinal catarrh, from the loss of general muscular power, and frequently occurs in women from relaxed conditions of the abdomen following pregnancy. In such cases systematic massage of the abdomen is invaluable, and, combined with attention to diet and hygiene, will frequently restore normal activity to the bowels. The nightly application of warm olive oil over the bowels, with rubbing and gentle kneading of the abdomen, is very beneficial. When kneading the abdomen it is usually well to direct the pressure along the course of the large intestine. To do this, commence low down on the right side and press gently, but firmly, with the hand, previously anointed with the oil, and draw it upward to the lower border of the ribs, then cross the abdomen to the left side and descend to the inner surface of the left thigh. This manual massage repeated a number of times each night before retiring, together with attention to habit, diet and exercise at all times, will greatly improve the tone of the abdominal muscles and the muscular coat of the intestines, increase the secretions, and gradually establish regularity of action. A cold sponge bath in the morning upon rising usually acts as a healthful stimulant to the bowels. It should be immediately followed by friction with a coarse towel over the abdomen and general surface of the body.

The matter of diet is of the highest importance in promoting and maintaining regularity of evacuations from the bowels. In the first place, the frequency and copiousness of the evacuations are influenced by the appetite and the quality of the diet consumed. When the diet consists mainly of concentrated and highly nutritious food, the quantity consumed is likely to be minimized and the waste material thrown off by the bowels is correspondingly reduced in quantity and of a nature prone to induce constipation. In such cases, a diet more bulky and less nutritious, if gradually substituted, will aid materially in overcoming the difficulty. Excessive perspiration and free diuresis sometimes have the effect of inducing temporary constipation by lessening the proportion of fluid voided with the fæces, but constipation thus caused tends to right itself with the disappearance of the condition occasioning it. In fevers constipation frequently occurs from a like cause.

Owing to the possibility of disturbing the processes of digestion, a change of diet must frequently be effected gradually; while with not a few individuals special precautions must be taken in the selection and preparation of the food. It is neither necessary nor desirable to barter constipation for dyspepsia. Fruits in general are laxative and are justly included in the dietetic measures for the relief of constipation. For some persons raw ripe fruits answer well, while others who are inclined to dyspepsia can use them only when cooked. Again, it has been well said of fruit: "In the morning it is as gold, silver at noon, and lead at night." Raw fruit should usually be eaten in the morning, never at night, and for the relief of constipation acts best when taken on an empty stomach before breakfast. An apple or an orange eaten before breakfast and followed at once by a glass of cold water will often produce a free evacuation of the bowels soon after breakfast. Among the available laxative fruits may be mentioned oranges, apples, apple-sauce, baked apples, dried apples, stewed prunes, figs, bananas, peaches, rasins, grapes, and strawberries.

Most fresh and green vegetables are useful. Spinach, dandelion greens, stewed rhubarb, rhubarb pie, ripe and stewed tomatoes, etc., may well be included. Well-boiled oatmeal porridge with milk is useful and should be eaten at breakfast, although it should not ordinarily constitute the entire meal. Bran-bread (bread made from unbolted wheat flour) is decidedly laxative to most persons and should be largely substituted for the ordinary white bread. Coffee and cocoa favor the action of the bowels more than tea, but where there is a decided bilious tendency the former should be used sparingly or entirely omitted. The systematic use of hot and cold water as a beverage is a simple and useful aid to regularity of the bowels. A half-pint of cold or hot water sipped slowly early in the morning will greatly aid other measures. The effect can be increased by taking a like quantity in the same way before going to bed at night. All persons should thoroughly masticate their food, but particularly the costive and dyspeptic.

◆

VEGETERIAN DIET IN GOUT AND BRIGHT'S DISEASE.*

THE well-known observation of Cullen that gout seldom attacks those who live much on a vegetable diet can probably be better understood and appreciated to-day than at any time since he made it. For not only do we find that the sufferers we meet with have generally for years previously been on a liberal allowance of animal food, and have frequently also partaken freely of ale or wine; but we know that in Scotland, where less animal food is taken, and where the national beverage (unlike the above ale or wine) contains almost no acid, gout is comparatively rare; while the Scotch, as individuals, have no immunity except just so long as they continue their national habits as to diet.

Obviously an animal diet will increase the formation of uric acid, and it has been contended that it will also directly introduce into the body uric acid, or other members of the xanthin group ready formed; and lastly, the salts contained in the animal food will diminish the alkalinity of the blood and so diminish the amount of uric acid it will hold in solution and bring to the kidneys for excretion. In these three ways then—by increasing formation and introduction, and by diminishing output, an animal diet will tend to bring about an accumulation of urates in the body.

A vegeterian diet, on the other hand, will diminish the formation of uric acid, will directly introduce less uric acid or xanthin compounds, and, lastly, its salts will increase the alkalinity of the blood, so that all urates will be held easily in solution, and freely excreted. Here, then, is a pretty complete explanation of Cullen's observation, and it answers the questions of causation and prevention.

We can see also that if Cullen's observation is as correct as it appears to be, inheritance and diathesis must count for little, and diet for much. And when we say that a man inherits gout we mean that he inherits the tendency to live as his father lived, as well as the means of indulging freely in meats and wines; and that if he should by chance lose his fortune it would not be very surprising if he lost his gout also.

Does what is so often said about gouty inheritance really mean any more than this? Is it really true that a condition or tendency can be inherited which will one day develop into manifest gout no matter what diet it is nourished on? In this case the value of vegetarian diet in gout is problematical; but surely all recorded experience both in etiology and treatment is in favor of Cullen's observation.

When gout is present and the urate accumulations in the body are already large, we must not only limit formation and introduction, but also provide for the elimination of the accumulations, If the patient is robust and has a good digestion, and can be persuaded to become voluntarily, as regards his diet, a poor man, and more or less a vegetarian, the increased alkalinity of his blood will lead to the gradual elimination of the accumulated urates, while the diet reduces their introduction and formation. If, however, he is old and on the borderland of feeble and failing nutrition, he is not likely to be troubled with very acute gout, and it may be sufficient to replace his wine by whiskey, and to cut off his soups and meat extracts, by which much urate is directly introduced, leaving his other animal food untouched. In such a case a rigid vegetarian diet would bring a large amount of urates through the blood, and these would cause further failure of nutrition and perhaps precipitate in one way or another a fatal result; here nutrition is more important than the gout, and a strict diet is both unnecessary and inadvisable. Doubtless also there are all intermediate conditions between these two requiring various modifications in the strictness of the diet.

---

* *British Medical Journal.*

The diet treatment of Bright's disease presents a problem at once more complex and less susceptible of demonstration; for we have here to deal not merely with the formation and introduction of urates, xanthins, and other nitrogenous extractives which are known to be present in the blood in Bright's disease, and to be causes of further alterations in circulation, nutrition, and metabolism, but we have also to consider both the quantity and quality of the albumens we give, with reference to the power of the living tissues to assimilate them. But fortunately there is a food in common use—namely, milk—which, while introducing but little effete nitrogen, presents also the forms of albumen which are most easily assimilated, and which thus fulfils both indications. In cases of albuminuria without definite kidney lesion, putting the patient on milk will often at once remove the albumen, but in cases where there is a lesion of structure the same diet may produce no immediate effect on the albuminuria.

The milk diet cannot do more than prevent an excess of diffusible albumen in the blood and diminish the kidney irritation which the passage of this foreign substance produces, so that Nature will be free to repair the damaged structures and gradually shut off the passage of the blood serum through them. Here we must estimate most carefully both the extent and the duration of the lesion, and not expect complete repair where it may be impossible. For instance, when the quantity and quality of the casts point to an extensive lesion with advanced degenerative changes, if a milk and vegetarian diet contributes to prevent a relapse into a more acute condition, and helps to bring about in course of time a gradual diminution of the extent of the lesion, it has done very well indeed, and all that can reasonably be expected of it as regards the kidney.

But its effect on the blood is even more important; for if the troubles of Bright's disease are due to the presence of toxic substances in the blood which interfere with the nutrition of the skin, the muscles, and the important glands, and diminish their metabolic activity, then a milk and vegetarian diet which, while maintaining nutrition, causes the introduction and formation of but little of these toxic substances, is of the utmost importance; and if its use is followed by a lowering of arterial tension, an increased flow of urine, and a diminished tendency to headache and other signs of impending uræmia, we may rest satisfied that we are doing all that diet will do for the good of our patient.

On the other hand, where everything points to a chronic and quiescent kidney lesion, the original failure in the metabolism of albumens having subsided, much greater freedom in diet may be allowed; and we may find that eggs, fish, and even small quantities of meat affect the output of albumen but little; while in early and acute cases the smallest departure from absolute milk diet may at once greatly increase the albumen. Here absolute milk diet is indicated; but in the former case we may give other animal food, always, however, bearing in mind the importance of not introducing in large quantity the nitrogenous excreta of other animals; so that milk and cheese, which contain probably a much smaller quantity of these products than eggs, fish, fowl, or meat, are to be preferred to them.

For this reason soups made from meat, beef-tea, and meat extracts, which contain the maximum of excretive products with the minimum of nutritive matters, should be entirely avoided; while a milk and vegetarian diet, even if it does not bring about complete repair, will do less than any other diet to increase the kidney lesion; and, as regards the blood, will do more than any other diet to keep it free from uric acid and other toxic products of nitrogenous metabolism.

THE DIET OF SCHOOLBOYS.*

On few subjects has more ink been wasted than on the best foods for the healthy, and the evolution of the chemistry of digestion had not till recently advanced sufficiently to afford such a scientific foundation as we might desire. In the last ten years, however, Ewald, Boas, Einhorn, and others have thrown much light on the gastric stage of digestion, and the investigation of diabetes and alcoholism has resulted in the gain of a few principles of alimentation. It is now possible to lay down a scientific dietary for certain diseases, so as to meet a single difficulty of digestion or absorption; but the rules of diet best for the healthy are still largely based on unsystematic observations. There is an initial difficulty in the extraordinary diversity of diet used with success by people inhabiting different countries. Pure vegetarian races are found side by side with pure flesh-feeders in the same climates. A radical change in diet for a given race is brought about by political or economic conditions. Such has been the introduction of potatoes, sugar, and tea among the English, and the abolition of alcohol among Moslem nations. The proper time and interval for meals has been laid down with much gravity and the assumption of scientific knowledge. yet we find perhaps a third of the human race flourishing on two meals daily, others taking regularly three to five, and, it may be from habit, unable to work if their food is given otherwise. Some writers have gone so far as to argue that the actual diet of a given race has been evolved as the most suitable for it in its special environment, but this is manifestly untrue if we regard the changes brought about by fashion and economic conditions. It is clear, then, that the human body has enormous powers of adaptation, and can obtain sufficient nourishment from the most diverse food-stuffs, though it is influenced, no doubt, by ancestral habits and psychical causes. Though it is true that we can obtain the requisite number of grains of nitrogen and carbon from numerous easily-digested substances, we are closely tied down in recommending a dietary by the habits and fashions to which our patients are accustomed; otherwise, disgust and nausea will neutralise our efforts. We have, then, in choosing a diet for schoolboys, to make the best we can of the common national dietary and modes of feeding, and bring them as near as possible to a scientific ideal suited to the end in view. That end is not that of the cattle-feeder, to obtain the most rapid growth and fattening, but primarily to obtain the most healthy and enduring physique of which the race is capable. The schoolboy has to carry on mental labor and considerable athletic toil, as well as to maintain his growth and development.

Many invaluable practical rules are given by Dr. Clement Dukes in his "Essentials of School Diet," founded on his observations of Rugby boys. Yet the difficulty of the problems involved is shown by the very tables of growth which he quotes as showing the effect of deficiency of food in preventing growth. Thus, over 7,000 individuals of the poorer classes are compared with an equal number of the better-fed as to their rate of growth in height and weight from 10 years of age; and the surprising fact comes out that, though the better-fed weigh some 22 lbs. more than the worse-fed laboring classes at 20 years of age, their excess in stature is only that which they possessed at ten years old, viz., three inches, which is very possibly hereditary. Thus good feeding seems to have little or no effect on stature, so far as these tables go.

---

* *The Hospital.*

It seems clear from the experience of Dr. Dukes and others, as well as from the results on animals, and from the analogy of Nature's food for the young—milk—that some excess of nitrogenous food should be supplied to growing individuals, and Dukes recommends for the boy of fifteen some 8 ounces of cooked meat daily, besides milk, eggs, cheese, &c., or a total of 12 ounces; but Savory, from his observations on 500 boys at Haileybury, finds that an individual on the average will rarely eat more than 4½ ounces of meat at dinner, and all authorities are opposed to meat suppers. Hence, if the 8 ounces of cooked, boneless meat are to be got in, some 3 ounces must be given at breakfast, but the amount is probably more than is needed. The Rugby boy gets in addition about 28 ounces of milk daily, besides smaller quantities of soup, fish, and cheese during the week. The carbohydrates are usually obtained in the form of bread of various kinds, of which Savory finds that more than 14 ounces daily are rarely eaten; potatoes to the amount of 8 ounces, sugar which is recognized as a most useful food, in spite of the disfavor with which it was formerly regarded. The fats so much disliked by children generally must be given as butter, or in suet puddings or as milk, and as the fat of meat to the amount of some 3 ounces daily. Mineral matter and vegetable salts must be supplied as green vegetables, fruits, and, if possible, by the use of wholemeal bread, though the difficulty of obtaining the latter in a form palatable to persons accustomed to white flour is considerable. In the Haileybury diet, which corresponds pretty closely to Parkes' dietary tables for individuals weighing 110 lbs., we find that the daily average amounts to 48 ounces of albuminates, 27 ounces of fat, 12 ounces of carbohydrates, and half an ounce of salts. The salts and fats here seem somewhat deficient, probably from difficulties in English cooking and the taste of boys. The amounts, of course, are reckoned without water and correspond to about twice as much food in the state it is usually served

THE FUNCTIONS OF THE STOMACH.*

THE GREAT progress which has been made in the study of the chemical processes of digestion has not been attended by a corresponding progress in the therapeutics of indigestion, probably for three reasons:

1. Because too much reliance has been placed upon pharmaceutical preparations as a means of correcting the morbid conditions of the stomach.

2. Because of insufficient attention paid to other functions of the stomach than those concerned with the chemical processes involved in the liquefaction of the food.

3. Because of neglect to consider the fact that proper liquefaction of food in the stomach requires the conversion of the starch by salivary digestion as well as the solution of proteid matters by the gastric juice.

Indeed, from numerous observations made by the writer, the conclusion seems just that the failure of proteid digestion in the stomach is much less likely to give rise to disordered digestion than the imperfect digestion of starch. It is probably for this reason that an exclusive meat diet, the milk diet, and other dietaries excluding starch have won so much reputation in the treatment of chronic indigestion. These exclusively nitrogenous dietaries are most successful in cases of hyperpepsia, although these are the very cases in which, from a physiological standpoint, they would seem to be least indicated.

It is in hyperpepsia also that the inconveniences arising from the indigestion of starch are most likely to occur. The fermentation of starch is an acid fermentation. This may occur in connection with hyperpepsia, while the fermentation of proteids is hindered by the presence of an abundant quantity of hydrochloric acid in the stomach. Hence we find proteid fermentation most frequent in hypopepsia, and acid fermentation most frequent in hyperpepsia.

---

*_Modern Medicine._

Professor Moritz, of Munich, in a recent lecture, made a number of interesting points, some of which are almost revolutionary in their significance. They may be summarized as follows:

1. The digestion of animals—at least, dogs—may be maintained after the removal of the stomach, as is shown by the experiments of Czerny and Kaiser. This agrees with the observations of Noorden, Ewald, and others, upon human beings, to the effect that good health may be maintained notwithstanding the existence of almost complete apepsia, the liquefaction of food in these cases depending upon the action of the saliva in converting the starch into dextrin and sugar. This change is often found to be complete in cases of apepsia, according to the writer's observation.

2. Von Mering, Moritz, and Brandl have shown by experiments that the stomach cannot be regarded as an organ for absorption, except for alcohol. Since alcohol is an artificial and not a natural product, and never intended by nature to serve as a food, it would appear from these experiments that the stomach cannot be regarded as an organ of absorption, except with relation to morbid and toxic substances.

3. The result of this fact is that the food-substances of the stomach are kept in a diluted condition, and thus prepared for easy entrance into the intestines, and for ready absorption after their passage from the stomach into the lower portion of the digestive tract. Röhmann has observed that concentrated solutions of sugar are not readily absorbed in the intestine, and that solutions having a strength of 5 per cent. are most readily absorbed.

4. Quincke has shown that equalization of temperature takes place readily in the stomach, and that the stomach is not much disturbed by considerable extremes in temperature, although this is not true of the intestine. Bunge has shown the importance of the antiseptic function of the stomach through the influence of hydrochloric acid. We showed in a paper recently read before the American Academy of Medicine that the stomach itself is an organ of antisepsis, independent of the hydrochloric acid which it contains. Professor Moritz goes a little further, and claims for the stomach that its chief purposes are: (1) To serve as a reservoir in which the food is liquefied and its supply to the intestine regulated, thus favoring complete digestion and absorption. (2) Protection of the stomach against bacterial, chemical, and thermal causes of injury by disinfection, by dilution, and by the modification of temperature.

BUTTER FROM STERILZED MILK.

A MACHINE has been invented by a Swedish engineer which will transform sterilized milk into butter in one minute. Not only is time saved, but the butter is made absolutely pure and free from germs. The milk is heated in the sterilizer to 160° F. From the sterilizer it runs into a churning chamber, where it is cooled down to 60° in its progress, by means of very small cooling frames, through which iced water constantly passes, and which revolves with the churning chamber at the rate of six thousand revolutions a minute. Several advantages are claimed for this remarkable machine, which bids fair to create a revolution in butter-making upon a large scale. In the first place, by sterilizing the milk, disease germs, if they are in it, are destroyed, as well as the microbes which cause putrefaction of the butter. The process of butter-making is so rapid that there is very little chance of any germs that may exist in the atmosphere of the dairy getting into the butter, especially as all, or nearly all, air must be forced out of the chamber of the machine by the extreme rapidity of the movement going on inside. When the butter is once pressed, the possibility of germ impregnation is almost eliminated. Thus a wholesome and permanently pure butter is produced. Another advantage is that milk can be converted into butter directly after being obtained from the cow.—*Med. News*, 1896, lxviii, 731.

CONSTIPATION; SOME OF ITS EFFECTS, AND ITS NON-MEDICINAL TREATMENT.*

BY E. S. PETTYJOHN, M. D.
Alma, Mich.

THE large number of people suffering from constipation and its effects, and the clinical difficulty met in obtaining relief therefrom, leads to the conclusion that the full signification of this affliction and its deleterious influence are not comprehended either by the people or the profession.

In its reciprocal influence this condition sustains both a causative and a resultant relation. Constipation as a functional disorder may be defined as an abnormal condition of the great colon and the entire intestinal tract, manifested by the unusual retention of excrementitious material, both as to *quantity* and *time* of evacuation. It may be owing either to diminished action of the muscular coat, to the diminished secretion from the mucous membrane, or both, to defective innervation, to habits and occupation, climate or diet, in addition to which there seems to be an infinite variety of causes.

A study of the history of 300 cases shows that about 60 per cent. of patients are suffering from this ailment, and that the number is proportionately larger among women than among men.

Congenital constipation may occur dependent upon the anatomy of the colon, the water being absorbed by a reduplication of the colon itself, especially the descending part, as that part is longer in infants in proportion as compared with the ascending and transverse, and hence liable, by being crowded down into the pelvis, to flexures and reduplications that favor impaction.

In adults the transverse colon is most liable to variation in length and position, and being smaller in diameter than the ascending, aside from congenital malformation, may be bent downward almost to the pubes by long continued distension, forming a sharp bend at the sustentaculum hepatis and at the splenic flexure, as has been found in two cases under the writer's observation.

In considering this condition, we regard individual habit and idiosyncrasy and compare with the rule, as persons do become constipated without notable or sensible inconvenience to themselves, without manifesting any of the local symptoms, and while having regular and apparently sufficient evacuations.

We come to the consideration of constipation more on account of its relation to other ailments and the entire system, than because of the mere inconvenience induced. The intestines and colon and the rectum are considered as digestive, eliminating and secreting organs, and also as organs of absorption.

With their great extent of retiform tissue enclosing a multitude of blood vessels and nerve ramifications, with their mucus follicles and valves of retardation, with their glands, lacteals, arteries and veins, the powers of retention and absorption belonging to this tripod are beyond compare. The wonder is that all the contents which enter are not taken into the circulation.

While the colon and rectum have not the digestive office we have long supposed, their absorptive power is greater than has been thought, and the quantity absorbed is in proportion to the time of contact and concentration of the substance. While these organs seem in a certain sense endowed with the power of selection they do absorb digested aliment, medicines and deleterious material with about the same avidity.

The intestinal nervous system is noticeably complex. Filaments are received from the pneumogastric, the sympathetic, and from the lumbar cord. After having been distributed to the plexus of Meissner under the submucous coat and the plexus of Auerbach between the muscular planes, branches thence supply the glands, muscles and blood vessels. Some preside over the absorbents and secretions, others over the peristaltic muscular movements, others over the intestinal circulation. Not only do these medullary and ganglionic systems direct the functions of the intestines, but through them the nerve centers of the brain have a direct influence over the entire apparatus. Since all functional action in the system is reciprocal, it follows that the functional activity of the chylopoietic system must effect the nutrition of the brain and entire nervous system.

---

* Read in the Section on Practice of Medicine, at the Forty-seventh annual meeting of the American Medical Association, at Atlanta, Ga., May 5-8, 1896.—*Journal American Medical Association.*

We acknowledge that human life is a constant processional activity of elimination and repair, metabolism occurring everywhere. Observation is demonstrating the part taken by bacteria and microbes in this process in the mouth, stomach and intestines. In the chemic, fermentative and putrefactive changes thus occurring, ptomaines are being constantly produced which, when absorbed as toxic and excrementitious substances, produce retrograde changes in the quality of the blood, diminution of the red blood corpuscles, and by supplying an infected or imperfect nutriment to the brain, become a prominent factor in the production of cerebral anemia and nervous debility only limited in its effect by the shortening of the microbal longevity from the effects of its own secretions. If this deficiency of nutrition or the supply of toxic material be continued, the increased nervous irritability is followed by a decrease, and withdrawal of nourishment is followed by brain exhaustion.

From the normal intestine Babes isolated five species of bacteria, whilst an enormous number of micro-organisms were found in the large intestine and feces. Bouchard says: "The conditions favorable for the maintenance of putrefaction are so numerous that we ask whether digestion can ever go on normally?" While the hydrochloric acid of the stomach neutralizes the infectious agents, they are passed into the intestines in a state of latent activity, when fermentation again begins. While the bile arrests fermentation, it is also capable of putrefaction, which is no doubt one of the causes of the offensive breath in constipation. We thus find the small intestine, and especially the large intestine, in a condition to pass products of putrefaction and toxic substances into the blood current. Since our most inoffensive and most valuable foods (meats) produce toxic substances; since the bile contains poison and the putrefactions of undigested residue produce poison, and the fecal matter is toxic, with all of these shut up in the intestines and colon, how can the guilty (those who do not believe in defecation), or even the innocent, escape destruction? If the kidneys are acting well, some of the toxics escape through the urine, and if the skin is eliminating, it furnishes relief, but these are rather remote sources of exit for so large a quantity of excrement when the way to the outside world is so close at hand.

Hypochondria, nervous depression, nervous headaches, functional neurasthenia, migraine, vertigo, disorders of nerve sensibility, noises in the ears, dyspepsia and depression incidental thereto, with a long train of psychic, nervous and nutritional troubles, are directly or indirectly the result of constipation. Even when many functional difficulties seem to be the primary disease, they only form an arc of a vicious circle begun with the nucleus of constipation.

The mechanical pressure against mesenteric blood vessels by over-distended bowels, especially if long continued, causes increased flow of blood to the brain and a temporary hyperemia with its concomitant symptoms, like an Esmarch bandage about a limb, or a sudden cooling of the surface of the body which in winter is the cause of more frequent cerebral hemorrhages than at other seasons, or like the sudden suppression of the menses or of an hemorrhoidal discharge, or even the straining at stool, all of which are to be avoided in apoplexy and cerebral congestion, on account of the increased pressure of blood in the brain which they produce.

The nervous system, as the master tissue of the body, needs the highest nutrition, and hence is most easily disturbed. It is fed in its truest sense by the overflow of nutriment after its refinement and elaboration in other tissues. Whether the nerves are nourished by the plasma reaching the axis cylinder at the nodes of Ranvier or not, we believe with Waller that the nutritional activity of nerve fiber is in the direction of its normal physiologic activity. Any inhibition of this function will lower the nerve excitability. A long period of repose not only lowers the excitability but, if continued beyond a certain limit, atrophy and degeneration occur in the nerve substance itself.

Continued unusual pressure produces excessive activity of the nerve supplying the part, excitability is finally abolished and exhaustion of the nerve occurs locally (as in over-distension of the bladder), or it may even produce a neuritis. A constantly overloaded condition of the bowels may produce either of these local results on the nerve filaments themselves. The effect of this travels backward to the controlling ganglia in the lumbar cord and defecation, to some degree a reflex act, when its directing centre is not sensitive to the controlling impulse of the brain, does not occur promptly, and the constipation thus reacts upon the whole system.

In patients who complain of symptoms referable to the spinal region, and where there is entire absence of anatomic affections of the cord, and often when these manifestations are united with cerebral symptoms and there is general disturbance of the entire nervous-system with a neurotic heredity, it is very frequently a functional trouble. Such a case recently came under my care (from the country), a Miss M., aged 32. She had previously been afflicted with convulsions, supposed to be epileptic, at and since puberty, but had had none for two years previous to my seeing her. She complained of attacks of severe occipital pain when she would become nauseated and dizzy. At the same time she would have a convulsive-like attack with irregular tremors and a peculiar nodding and swaying movement of the head, which she said she was unable to control. She also had pain in the cervical and lumbar region, deep-seated. These attacks occurred irregularly from one to twelve weeks apart. She was an invalid each time from five to fifteen days. She had been treated for several years and informed by her physicians that she had epilepsy and disease of the spine. Thorough examination revealed absolutely no signs of spinal disease nor anatomic disturbance of the cord. After three months of treatment she fully recovered, beside having gained eighteen pounds in weight. The late Dr. Jewell believed and taught that the effect of constipation might produce a condition of the brain akin to, or that could be classified as, transient mania.

The first elements in curative treatment, I consider good food and good digestion. The diet should consist of coarser foods such as would leave a residue and aid in increasing the bulk of fecal accumulations. Broths, fish with the skin, fresh meats not too tender, whole-wheat and graham bread, mush, hominy, corn bread and all green and watery vegetables, baked potatoes, with skins, and cereals containing hulls and fine seeds, prunes, figs, apples with the peeling and all fruits generally. Rest in the recumbent posture for a half hour or more both before and after eating is of value.

Massage on anatomic principles I place first in the mechanical treatment. The manipulations should not be used until two hours after a meal. The thighs should be flexed and the abdominal walls relaxed. The treatment should be given dry, stimulating first the skin then the walls of the stomach, the different sections of the colon and the intestines. Pétrissage given so as to impart an oscillating and vibratory movement, combined with the varieties of tapotement, are the best forms of treatment. Cases of obesity and atony of the muscular coats and chronic intestinal and gastro-intestinal catarrh, are relieved in two to four months. The intestinal secretions or increased obstruction of the bile duct is relieved, the peristaltic action is stimulated, and the contents of the sigmoid flexure and entire colon are pressed toward the rectum. If there are biliary calculi no pressure should be made on the adjacent parts, although usually pressure should be made over the fundus of the gall bladder, to assist the bile toward the intestine. The stimulation of the skin, which is here supplied by the last seven dorsal nerves the same origin as the splanchnics, as well as the plexus of Auerbach, and the mechanical effect of moving pressure do bring favorable results.

In the use of the cannon ball three or four pounds in weight the patient or operator should be thorough and systematic. The ball should be rolled over the entire abdomen, being used for five or ten minutes morning and evening, the treatment ending by the patient balancing the ball for a few minutes on the navel.

In gymnastics all movements that use and strengthen the abdominal muscles, such as lying on the back and raising the limbs perpendicularly, the flexion at the hips, twenty or thirty times each morning and evening.

Rowing, horseback riding and cycling are helpful if used regularly. While it is best to have a definite hour, that is not essential, but when a time is fixed, if the preceding half hour is devoted to the voluntary contraction of the anal sphincter muscles, the reflex effect is to aid in stimulating the peristaltic action. Time should be given, and one should go for relief on the first prompting.

The faradic current of sufficient strength to produce contraction of the different portions of the intestines and colon is helpful. The galvanic current; the cathode in the rectum, large anode over abdomen, repeated daily at the same hour is effectual.

Hydro-therapeutics have proven successful remedies in the author's practice. Drinking large quantities of cold water on arising and an hour before meals, and two or three hours after food, taking during the day 70 to 80 ounces, beside that with the meals, is of exceedingly great value. This remedy, with regulation of habit, has cured many cases.

Fomentations to the bowels, stomach and liver daily and a cold pack to the bowels at bed-time, have been successful. Alternation of hot and cold to the spine and the cool bath have shown results.

The difficulty I find in the use of any, or a combination of these measures, is to induce the patient to be systematic and persistent in following directions. But I am thoroughly convinced that by these means producing constitutional and local effects, more, satisfactory results are obtained than with medicines, and, when the patient recovers, he stays well.

That constipation has a psychic and moral effect the laity recognizes, and we will all agree with the author who says: "Those persons whose bowels are freed by an easy, regular movement every morning, so soon as they have breakfasted, are meek, affable, gracious, kind, and 'no' from their mouth comes with more grace than 'yes' from the mouth of one who is constipated."

◆

THE DIETETIC INFLUENCE OF CHLORIDE OF SODIUM.

The editor of *Modern Medicine* is of opinion that the excessive use of salt is a most common dietetic error, although but seldom alluded to by writers upon dietetics. The observations of many travelers, he says, as well as many facts of common experience, contradict the conclusions of Boussingault regarding the necessity for the admission of this ingredient to the food of human beings. The practice should be viewed as chiefly a matter of habit, Nature having probably exhibited the same wisdom in regard to the amount of chloride of sodium placed in our food as with reference to the other salts required by the system.

Experiments by European investigators some years ago also go to show that the use of chloride of sodium as a condiment is injurious to digestion in two ways:

First: It diminishes the amount of hydrochloric acid present in the gastric juice by provoking the secretion of a large quantity of neutralizing alkaline mucus.

Second: It diminishes the disinfecting power of the hydrochloric acid which is unneutralized.

In view of these observations, it must be clearly evident that the amount of chloride of sodium used should be reduced to a minimum. The presence of so much of it as exists in the urine and the perspiration is evidence that it is not utilized in the same way as organic food substances; in other words, it is neither changed nor retained in the body, but is rather discharged from it, and it is easily conceived that additional injury may arise from the excessive eliminative work required of the kidneys in consequence of its excessive use. For many years the writer has found it wise to urge upon patients suffering from indigestion the importance of lessening the quantity of salt taken with their daily food.

It is estimated that we daily consume about 140 grains of salt, which Dr. C. W. Woodward concludes (*Eclectic Medical Journal*) is entirely too much. Persons who have eaten from one to three drachms of salt daily for years are affected by several of the following symptoms:

1. A thickening and partial paralysis of the vocal cords, and an almost continual sore throat.
2. A pale and waxy color. A dryness of the cuticle, which perspires too freely upon exertion.
3. Constipation.
4. Chronic diarrhœa.
5. Abnormal appetite.
6. Retarded endosmosis and exosmosis.
7. Plethora and corpulency.
8. Thins the blood, causes slow circulation, and lowers the temperature.
9. Increases catarrh and prevents its cure.
10. Causes dandruff of the scalp.
11. Causes skin diseases.
12. Causes deposits and abscesses.

A number of cases are given with one or more of the above symptoms predominant. In all the salt was restricted and depurating medicines given with good results.

In catarrhal diseases, the use of salt aggravated the symptoms; removing it effected a cure. The reason given is that the skin not acting, from the effect of the salt, the mucous membrane had to perform an extra function, hence the discomfort. It is stated that acrobats eschew salt; that the Parisians, twenty years ago, deprived inebriates of salt. In six months all taste for liquor was gone.

DIET IN ULCER OF THE STOMACH.

THE dietetic treatment of ulcer of the stomach, says *Gaillard's Medical Journal*, is of the greatest importance. Few diseases, in fact, show the results of properly regulated diet more decidedly. A diet should be chosen which is bland and unirritating, which does not excite the acid secretions of the stomach, which remains but a short time in the stomach, which does not tend to cause extension and peristaltic action, and which does not tend to undergo rapid fermentation. At the outset of treatment, it is usually wise to employ rectal feeding for a few days. Food in small quantities may then be administered by the stomach.

The best diet in most cases is unquestionably milk. Its value has been proved beyond doubt. If the patient will tolerate it the milk should be thoroughly peptonized. It should be administered at frequent intervals, and in not too large quantities. Four ounces every two hours are usually sufficient. If the milk is not tolerated or does not agree, whey may be administered for a time, but it should be remembered that it contains but little nutritive material. Buttermilk may sometimes be substituted for milk, but the acid in some cases causes too much irritation. Milk diet should not be abandoned until it has been thoroughly tested, and every preparation given adequate trial. If a milk diet is impossible, scraped raw meat should be tried. This may be given alone, lightly seasoned, or it may be given in broth. Expressed beef juice is an admirable article of diet in such cases, and sometimes proves of the utmost value.

Weak tea and coffee may be given in small amounts, but alcohol is contra-indicated. If hemorrhage occurs, the stomach should receive complete rest for several days, and nutrition should be maintained by means of nutritive enemata. A rigidly restricted diet should be persisted in for at least a week after all symptoms have disappeared, and the return to an ordinary diet should be made slowly and with great caution.—*New York Medical Times.*

ONIONS AS A NERVINE.

ONIONS are almost the best nervine known. No medicine is so useful in cases of nervous prostration, and there is nothing else that will so quickly relieve and tone up a worn-out system. Onions are useful in all cases of coughs, colds, and influenza; in consumption, insomnia, hydrophobia, scurvy, gravel, kidney and liver complaints. Eaten every other day they soon have a clearing and whitening effect upon the complexion.—*New York Medical Times.*

CREAM IN CONGENITAL CONSTIPATION.

A BROOKLYN physician states in the *Medical World* that the main dietetic cause of infantile costiveness is a deficiency of fat in the food. A large percentage can be successfully met by increasing the fat ingested. It has been his practice in the past two years to give the child from half to one tablespoonful of cream before feeding. The child may refuse to take it readily, but by sweetening the cream with loaf sugar, the child soon becomes fond of it and will accept all that is offered. Upon following this plan your cases of congenital constipation will suddenly diminish, and the child in the very depth of its soul will feel comfort.—*New York Medical Times.*

◆

WILLIAM C. USSERY, M. D., of St. Louis, says that the best food for those suffering from typhoid fever is the banana. In this disease, he explains, the lining membrane of the small intestines becomes intensely inflamed and engorged. Eventually it begins sloughing away in spots, leaving well-defined ulcers. At these places the intestinal walls become dangerously thin. A solid food, if taken into the stomach is likely to produce perforation of the intestines, and dire results will follow. Therefore solid foods, or foods containing a large amount of innutritious substances, as compared with nutritious substances, are dangerous and are to be avoided. The banana, although it may be classed as a solid food, containing as it does 95 per cent. nutrition, does not possess sufficient waste to irritate these sore spots. Nearly the whole amount taken into the stomach is absorbed, and gives the patient more strength than can be obtained from other food.—*New York Medical Times.*

MILK SUPPLY IN URBAN DISTRICTS.

By JAMES T. NEECH, L. R. C. P. Edin.,
D. S. Sc. Vict.,

Medical Officer of Health for Atherton: Physician to Leigh Joint Fever Hospital.

THE purity and wholesomeness of milk depend upon (1) freedom from adulteration, (2) health in the cow, and (3) freedom from contamination with noxious microbes. I believe adulteration is not so much practised as formerly. All samples taken in the Atherton district during the past four years have been of good quality.

As a high state of health is essential to the production of perfectly good milk, it is necessary that the cow should be placed amidst surroundings conducive to the maintenance thereof. In the summer months, whilst she lives entirely out of doors, such is the case; but during the remainder of the year, when confined partly or wholly to the shed, the conditions are changed, for cows are then frequently—I would say mostly—kept in sheds which are quite inadequate as far as air space is concerned. The largest of 12 cow-sheds, selected indiscriminately, and which, I think, may be taken as a fair sample of what is to be found in many districts, allowed 633 c. ft., while the smallest only gave 264 c. ft., of air space for each cow. Of these 12 sheds, 2 allowed less than 300 c. ft., 3 less than 400 c. ft., 4 less than 500 c. ft., 2 less and only 1 more than 600 c. ft., per cow. In Atherton the regulations require 600 c.

ft., and in the County of Lancashire, according to Dr. Sergeant's last annual report, the air space required in those districts where regulations have been adopted varies from 800 to 420 c. ft. These amounts I consider not sufficient, and that in every case at least 1,000 c. ft., should be allowed.

Cow-sheds as a rule are badly constructed, they frequently adjoin other buildings, and can be lighted and ventilated from one side only. The windows are small, some do not open, while those that will are seldom or never made use of. Hence in both lighting and ventilation they are very defective. The floors are often imperfect, and not laid with a sufficient and even fall to insure a quick discharge of liquid excreta. It consequently percolates the soil beneath; gases of decomposition arise therefrom and from the solid excreta, the removal of which is often delayed, and further contamination of an already polluted atmosphere takes places. Special openings for ventilation purposes are the exception and not the rule. Only two of the dozen sheds previously referred to have specially constructed outlets. Seeing that a cow requires an hourly supply of about 12,000 cubic feet of fresh air; free ventilation is absolutely necessary to the maintenance of perfect health.

The importance of cleanliness in the cowshed is not sufficiently realised by dairymen. The excreta are not removed often enough, and this is seldom or never efficiently done. Particles are left sticking to the walls and adhering to the floor ; a thorough cleansing with water, I believe, is rarely done. Limewashing is not attended to as it should be.

Cobwebs hang from the ceiling and in the corners laden with dust. Dust is allowed to collect on window sills and all surfaces capable of receiving it.

An improvement in the water supply to dairies in Urban districts has taken place in recent years, as many farms now have town's water laid on, and thus have a pure supply for cleansing and drinking purposes when the cows are at home. But some still rely upon local supplies, derived from shallow wells or small watercourses, and all more or less depend upon the water from ditches and stagnant ponds for the cows to drink when in the fields, all of which are very liable to the contamination of surface drainage and many other modes of pollution.

The food of cows should be wholesome and nutritious, and they should be fed, watered, and milked at regular times. Milk being such a fertile medium for the growth of microbes, although boiling will sterilise, it cannot remove therefrom the poisons generated therein by them. Hence the necessity of guarding, as far as possible, against the admission of dirt and germs to milk at its source. The atmosphere of cowsheds such as previously referred to must be laden with germs, which will gain access to the milk, especially when the can is allowed to stand in the shed during the milking process. The milkman seldom or never thinks of cleansing the cow's udder, if he does even his own hands, before commencing to milk. Consequently any dirt or germs hanging about the udder will fall into the milk pail. Although milk is such an important article of food, and when contaminated so potent a vehicle of disease, local health authorities do not seem generally to realise their responsiblities in connection therewith. The result is that the Dairies and Cow-sheds Order of 1885 is not administered in the strict manner which the necessity of the case demands. According to the last annual report of the County of Lancashire, out of 134 districts, urban and rural, in 17 the supervision of dairies and cow-sheds is described as *nil*, and no regulations are in force in 50 others.

All local authorities should take up the question in earnest. Regulations should be adopted in every district, and an adequate number of capable inspectors appointed to thoroughly and systematically inspect all dairies and cow-sheds, and see that they are enforced. Every cow should be examined by a veterinary surgeon and marked, before being admitted into a dairy and its milk sold. The inspector could then see at a glance what cows had been subjected to such an examination, and it would tend to exclude tuberculous cattle.

A cow-keeper should be compelled, under penalty, to notify to the health authorities the outbreak or existence of any disease among his cows, and if it appear to the inspector that any cow is diseased or out of health, he should have the power to call in a veterinary surgeon to examine the same, and decide as to whether its milk be fit for sale or not. The milk of a badly-nourished cow, even if no actual disease be found, cannot be wholesome as an article of diet.

A stricter supervision must be instituted, and there must be a more rigid enforcement of sanitary laws, if our milk supply is to be materially improved.—*British Medical Journal.*

◆

TOBACCO AND THE HIGHER EDUCATION.

In a note upon the above subject in the *British Medical Journal* of July 4th, the writer says, after referring to the statistics of smokers and non-smokers at Yale, "We do not know of any similar statistics from the colleges and universities of other countries." He may be interested, then, to know that in 1855 Dr. Bertillon, the most eminent writer on medical statistics of his time, found on inquiry made by him concerning the pupils of the Polytechnic School of Paris that 108 of the pupils smoked, and 52 did not smoke. He then arranged the 160 pupils into eight divisions, according to the place they held in examination, 20 in each rank, and found that of the 20 who stood highest, 6 were smokers and 14 non-smokers. Of the next 20, 10 were smokers and 10 non-smokers; of the next 20, 11 smoked and 9 did not smoke; thus showing how much higher the non-smoker stood intellectually than the habitual smokers. He also found that the mean rank of the smoker, as compared with the non-smoker, deteriorated from their entering to their leaving the school. As a result of Bertillon's inquiry, the Minister of Public Instruction of France issued a circular, addressed to the directors of schools and colleges, forbidding the use of tobacco and cigars to students.

This is an independent corroboration of the inquiries made at Amherst and Yale, U. S. A., and it is in consonance with the opinion of the late Sir Benjamin Brodie and Mr. George Critchett, and a host of our ablest physicians and surgeons of the past. For my part, I cannot help thinking that the use of tobacco is quite opposed to all true theories of health, and that the members of the medical profession should discourage smoking, both by precept and by their own example, which tells so powerfully with the rest of society.—C. R. Drysdale, M, D., *in British Medical Journal.*

Department of Hygiene.

WITH SPECIAL REFERENCE TO STATE AND PREVENTIVE MEDICINE.

Edited by HENRY LEFFMANN, M.D.

THE ENDOWMENT OF PUBLIC WORKS.

LIBERALLY-DISPOSED persons have abundant opportunities in civilized communities for exercise of their liberality. Not merely are the calls for individual alms-giving frequent, but the various organized charities are becoming so numerous and active that large sums of money are annually contributed to the maintenance of hospitals, colleges, aid-societies, and similar institutions. It is not necessary for us to discuss here how far these charities make the food they feed on. Capable observers have recognized, clearly, the abuse of public charity, and it is to be hoped that the agitation on this subject will lead to reform in the near future. It is our wish to discuss here a phase of endowment to which little encouragement or interest is given, but which is intimately associated with practical sanitary reform.

The tendency of modern life is to the development of large cities. Most men and women find in city life so much greater opportunities for earning and amusement that they crowd into insanitary quarters, bear with noise and dirt, and risk contact with the worst classes rather than endure the comparative isolation of the hamlet or farm. The problem of municipal management, both from a political and engineering point of view, is attracting the attention of many able men in all civilized countries, but especially in the United States, where the rapid growth of the larger cities and the changes in methods of life have been quite too great for immediate remedy. Even where there has been an anticipation of future greatness, developments in unexpected directions have occurred and portions of the city have been found unhealthy and inconvenient. From time to time such conditions become intolerable and must be remedied at any cost, and there are no more expensive items of municipal management than the adjustment of grades, re-alignment of streets, establishment of parks or boulevards, or similar operations for the safety or comfort of the citizens. We need only instance the Chicago drainage canal and the Philadelphia subway as examples. When improvements of this character are inaugurated by the government, the most serious items of expense are usually the land damages. The right of eminent domain secures the government from mere factious opposition to its plans, but the procedure by juries to assess damages is always an expensive matter, and the awards for the land and buildings are usually about double that which private parties would pay for them or that they would bring at a fair sale. It is because of the expense, that many beneficial public improvements, the advisability of which is admitted by all concerned, are delayed so long, and when ultimately carried out, the whole community is laid under a burden for the unreasonable compensation of few owners.

Simple business operations involving an outlay of money can generally be carried by individuals or private associations at less expense than by the public, and hence it seems that much good might be done by the establishment of endowments for the purpose of accomplishing definite interest of public comfort and convenience. Such provisions are indeed not unknown, but they are regarded as out of the line of devises and even as eccentric. Stephen Girard left a large sum for specific improvement in certain sections of Philadelphia, and probably every large city has some benefactor in this practical way. It is time, however, that an organized effort should be made to divert to the endowment of public works a reasonable proportion of the large amount of money that is annually devoted to charity by bequest or gift. The preservation of the public health is not solely a question of food and drink. The father of medicine recognized "the air, the water, and the place" as items in the general well-being. Relief of the discomforts of city life may well be an object of those who love their fellow-men. An owner of real estate may be persuaded to give thousands of dollars to endow a free-bed in a hospital or fund, a professorship or scholarship, yet, if asked to sacrifice a little of the area of his land to permit the abolition of a grade crossing or the widening of a street will refuse with scorn, and demand, and probably receive, extravagant damages. Memorial tablets hang in chapels, lecture halls and hospital wards, celebrating the munificence of donors; might it not also be a custom to exhibit a liberal disposition by some specific municipal benefaction. We are at first thought, perhaps, inclined to smile at the suggestion of a tablet erected on the highway and honoring the memory of some one who gave the money necessary to abolish a grade-crossing, or whose liberality secured the right of way for the opening of an interrupted street, but these are as much real charities as the founding of libraries or hospitals.

It cannot be said that such services should wait upon more serious and important work. Apart from the question as to whether or not certain forms of charitable relief encourage pauperism we will find on investigation that bequests are sometimes made for public purposes which are of very limited utility .or benefit. There exists, for instance, in a certain city, an active association which has the sole object of providing the public park with decorative works of art. Yet this park has long failed to yield its best return as a public pleasure ground because of the difficulty of access to some parts of it, and now this difficulty is to be remedied by the construction of an electric railway by a private corporation. Thus a valuable franchise is disposed of for a trifle, but if the above association had been devoted to some such practical benefit its money would have been spent in a better way and the obvious merit of its work would have secured a more abundant revenue. The same sentimental tendency is shown in the fact that recently a large American city has negotiated a loan of $8,000,000 for public works, of which $1,000,000 is to be devoted to beginning a public library, and not a cent for the filtration of its water-supply, although this is a disgrace to the city. If some citizen should give a hundred thousand dollars to improve the water-supply of a town, would it not be as noble a gift as to found a new hospital or a library or to build an ornamental fountain in the public square? In fact, the improvement of municipal conditions is equivalent to enlarging medical and educational institutions for they diminish the sum-total of disease.

It seems, then, reasonable to regard the endowment of public works as worthy of encouragement, and that we may hope that the time will come when it will not be considered odd or eccentric for a testator to provide for specific public improvement of an apparently purely utilitarian nature, such as the abolition of a grade-crossing, the widening a street, or the conversion of some slum district into a public park.

We do not overlook the fact that in many large cities extensive operations in the interest of the poorer classes have been inaugurated. "Model dwellings" are quite familiar, but there has been always more or less of a business element in these, although involving pecuniary risk and sacrifice. Such ventures are good in their way, but what is needed is the placing of every variety of public improvement in the same category with the long recognized objects of charity. Let it be considered as creditable an act to pave a street with an improved pavement as to found a hospital. The work is in the interest of better health and longer life, and enables the community to get along with less hospital accommodation.

◆

OPERATION OF THE PENNSYLVANIA FOOD-LAWS.

PENNSYLVANIA adopted a food-law in 1895 which agrees very closely with the laws in several other States. The text is brief, and sets forth certain classes of adulteration leaving to the courts largely the interpretation of the clauses. The enforcement of the law has been committed to the newly-organized Department of Agriculture. This is different from the method in most States in which either a special commission has been appointed independent of all other State Bureaus, or the State Board of Health has been charged with the enforcement of the law. Drugs are not specifically mentioned in the act, but it will require a legal tribunal to say how far the words, "Any article used as food or drink by man" will include drugs.

The Department of Agriculture has proceeded with commendable caution in enforcing the act. The executive officer of the Department is the Hon. Thomas J. Edge, formerly Secretary of the Board of Agriculture of the State,, and the specific duties of carrying out the details of the act are committed to the Dairy and Food Commissioner, Hon. Levi Wells.

In addition to the general act, there are several special enactments which date from earlier years and which relate to milk, butter and vinegar.

The recently published report of the Department of Agriculture gives an account of some of the work done in detecting adulterations. Among the articles examined were buckwheat-flour, butter, vinegar, spices, cheese, canned goods, lard, cream of tartar, and some preservatives. Buckwheat-flour is frequently adulterated with wheat-flour in large proportion. Vinegar is subject to very little direct adulteration except the addition of caramel for coloring, but much of the article sold as cider vinegar is merely dilute acetic acid and water. This point was presented some years ago in the GAZETTE when some analyses of American vinegars were given. It is scarcely necessary to say that spices were found to be largely adulterated, for this is an old story. Ground cocoanut shells are much used for this purpose. Cream of tartar, which the grocery trade classes as a spice, is not only largely adulterated with starch and other inert materials, but many samples are mixtures of acid calcium phosphate, alum, and starch. Cottonseed oil is, of course, sold extensively as olive oil, and mixtures of lard with other oils and fats are designated pure or refined lard.

The preservatives sold for farmers' use, especially for preserving milk, are generally mixtures of boric acid and borax. Investigation has shown that such a mixture is more effective than either ingredient alone. The Department has decided to forbid salicylic acid in all food preparations, and it is probable that some extended investigations as to effect of various preservatives will be made. One rather odd result of the investigation has been the discovery of some brands of mince-meat which contain no meat!

Numerous cases are awaiting trial, and we may expect much legal sparring during next winter when the courts will doubtless take them up.

◆

COMPARATIVE MORTALITY.

IN EXAMINING the files of some newspapers published in the last century, a statement of the death-rate of London in 1736 was found, and it is given herewith in contrast to that of Philadelphia in 1891, which happens to be at hand, and is representative of a modern city in fair condition. The first census of London was taken in 1801 when its population was 958,000. Its population in 1736 can only be estimated, but it could not have exceeded half a million, and it will be seen that the death-rate is very high.

	DEATHS IN	
	London 1736.	Philadelphia 1891.
Under 2 yrs.	10580	6927
2-5	2706	1552
5-10	993	978
10-20	816	359
20-30	2139	2022
30-40	2445	2047
40-50	2357	1812
50-60	2121	1855
60-70	1666	2122
70-80	1114	1975
80-90	557	954
90-100	83	133
Over 116	1	—
	27,578	22,736

Calculated from the census of 1890, the Philadelphia death-rate is 20.85 per thousand per year; assuming for London in 1736 a population of five hundred thousand, the death-rate is seen to be 55.15, more than double that of Philadelphia and more than three times that of modern London which is usually under 17 per thousand. It is also seen that the excess is not wholly accounted for by high infantile mortality, although the deaths under five years of age are much higher in London. A surprising point is the evidence of longevity in the earlier period, not only by the record of a death beyond 116 years, but by the figures for the deaths over the allotted three score years and ten.

◆

THE PUBLIC HEALTH ASPECTS OF TUBERCULOUS DISEASES.*

By JAMES NIVEN, M. B, B. C. Cantab.,
Medical Officer of Health to the City of Manchester.,

THE infectious nature of tuberculosis had been clearly demonstrated by Villemin, followed by Chauveau, Cohn, and Salomonsen. The discovery of the tubercle bacillus, however, by Koch, and the study of its behaviour and distribution both inside and outside the body, have greatly extended and have delimited both prevention and treatment. The most important point, so far as direct preventive action is concerned, is now seen to be how we may hinder tuberculous discharges from getting dried and dispersed as dust.

It has been doubted whether our attention should not be directed rather to general hygienic improvements than to specific preventive measures.

It is unquestionable that the development of tuberculosis in the individual is checked by good ventilation of the dwelling, plenty of light, dry rooms, healthy occupations, and avoidance of crowding. It is also, however, prevented by good personal habits, avoidance of excess in drink, and good diet—conditions not so amenable to control.

It is determined also by the occurrence of such diseases as measles and whooping-cough, of catarrhal conditions of the intestine, by physical vigour, and so forth.

Tuberculosis would undoubtedly be much diminished if the population could be put under favourable sanitary conditions, which would also do much to lessen other diseases; and our efforts to secure for the dwellers in our cities pure air, and for the homes dry, well-ventilated, well-lighted, and well-appointed houses, should never be relaxed. To attain such conditions as would render individuals reasonably safe would, however, be probably a far greater task than to obtain immediate and sufficient measures of prevention. Moreover, in face of the destruction of human life which is going on at present, both systems of procedure are required.

Preventive action should take something like the following shape:

1. Information as to the precautions needing to be taken should be distributed to every home from time to time, until a sufficient body of opinion is created on the subject.

2. Tuberculosis attended with discharge, should be made a notifiable disease. This would entail additions to the sanitary staff, including probably a qualified medical assistant. The objects of notifications would be: (1) To gather precise clinical knowledge as to the various conditions under which individuals contract tuberculosis. During

---

*British Med. Journal.

such an inquiry in Oldham in 1889 I found that about half the deaths from tuberculosis investigated were of people who had previously been in intimate and prolonged intercourse with previous cases. (2) To ascertain and remove insanitary conditions about the house as speedily as possible, so as to give a chance to the patient of recovery, and so as to diminish the risk to the other members of the household. (3) To distribute printed information on the preventive measures required, and to bring about an understanding with medical practitioners as to their giving systematic personal instruction to the patient and attendant. (4) To bring about the disinfection of rooms and clothing when needed.

3. Hospitals for consumptives are at present foci whence a practical knowledge of preventive measures radiates.

It may be doubted whether the time is ripe for the establishment of such hospitals at the public expense. If this becomes possible, such hospitals will greatly aid in reducing the amount of infective material in circulation.

4. To prevent the milk from tuberculous cows remaining the source of danger which it now is, we require a systematic examination of cows in all cow-sheds by competent veterinary inspectors. Two assistant veterinary surgeons have recently been appointed in Manchester for this purpose, and already five cows have been slaughtered as tuberculous and found to be so. This appointment is one which I have much at heart. The milk of suspected cows will also be examined bacteriologically where the grounds for condemnation are otherwise not perfectly clear. The veterinary surgeon is now authorised by the corporation to examine suspicious cows with tuberculin.

Under new regulations an effort will be made to bring the cow-sheds into a tolerably sanitary condition—at least those which can be so amended. If the cow-sheds are cleansed with water twice a day and the cows kept clean, and if in addition the cow-sheds are kept well lighted and well ventilated, then there will not be much risk of infection between cows and human beings or from cow to cow.

5. All meat and pork should be thoroughly examined; hence no meat should be taken direct from a private slaughter-house for sale. The presence of tuberculous glands in meat or pork should suffice to condemn it. In the cases of animals killed in the public abbatoir this criterion is not required. It is the more necessary that it should be rigorously applied in other cases,

6. Cats certainly, and fowls possibly, are a serious source of danger. More attention should be given to the diseases of which cats have died—and, indeed, the causes of death of all our domestic animals should be more fully investigated.

◆

THE CEMETERY AND THE WATER SUPPLY.

PETRIFYING springs, the waters of which are so highly charged with lime salts or silicates as to infiltrate and encrust objects suspended therein for some time, are known in most countries, but their relation to the question of earth burial has, we believe, never presented itself until this year. We learn, however, from a German paper that excavations, made with the view of ascertaining whether a portion of the churchyard at Löbau laid out in 1870 was ready for renewed interments, revealed the fact that the coffins were intact and completely petrified. On being broken open they were found to be full of water, and the corpses were sodden but hardened, though they had undergone a certain amount of putrefaction, pungent gases escaping as the coffins were opened. The surface soil was a heavy, impervious clay, beneath which was a water-bearing zone in which the bodies lay. In this instance the water affected them, but had it been of an ordinary character they might have dangerously affected it, the exclusion of air and the absence from the "dead" clay of the bacteria of nitrification having prevented any decomposition in the strict sense as distinguished from putrefaction. Thus, when part of the churchyard of St. Andrew's, Holborn, was excavated for the construction of the viaduct, the bodies were found "sandwiched," to use the apt expression of Dr. S. Gibbon, the medical officer of health, between the boards of the coffins, crushed by the superincumbent weight of clay; but from the "deadness" of wood and clay, decomposition and disintegration had been very slow, and there was but little difference between the state of preservation of those interred 200 years ago and those buried twenty years previously, when the graveyard was closed. Under such circumstances—that is, in non-nitrifying and, therefore, unsuitable soils—the pollution of the ground-water is inevitable, and though the danger to the public health is minimized by the provision of public water supplies from distant sources, it is a serious matter when the population depends on private wells. Thus at Vienna, previously to the inauguration of a public supply from the highlands, the effects of the pollution of the ground water gravitating from the cemeteries encircling the city on higher elevations were unmistakable. The water in the town wells became progressively more and more contaminated, until it was turbid, yellow, charged with nitrites, and finally redolent of sulphureted hydrogen and ammonium sulphide—in fact, absolutely unfit for any use. Yet clay lands, possibly from their lower price, seem to be generally chosen for cemeteries; all those around London, with very few exceptions, being of this description, though in some places good gravelly sites might have been found within a mile of those unfortunately selected. At Finchley the soil, though not gravel, appears likely to possess active nitrifying properties, being of a soft, friable, loamy character.—*The Lancet.*

◆

EATING WHEN FATIGUED.

Every one should know than to eat when tired is to place upon the digestive organs a burden which they are wholly unable to carry. When the body is in a state of fatigue, the digestive organs are unable to perform their natural functions; the glands of the stomach will not sorm gastric juice; the saliva is deficient in quantity; and the whole digestive apparatus is incapable of doing efficient work. When exhausted, one should rest before eating. If a faint or "all-gone" sensation is experienced, relief may be obtained by drinking a glass of hot water or diluted fruit juice of some sort.—*Mod. Med.*

◆

THE CONTINUED INCREASE OF CANCER, WITH REMARKS AS TO ITS CAUSATION.

By W. Roger Williams, F.R.C.S.,
Preston.

Mr. Roger Williams said that perusal of the last issued report of the Registrar-General, which showed that the cancer death-rate had once again surpassed every previous record, had stimulated him to bring the subject forward on this occasion, although much that he had to say was but a repetition of what he had previously stated. In this pushing age a certain amount of repetition seemed to be necessary in order to secure for a neglected subject its modicum of attention.

In 1840 cancer caused 2,786 deaths, the population being 1 in 5,646 of the total population, 1 in 129 of the total mortality, or 177 per million living.

In 1894 it caused 21,422 deaths, the proportion being 1 in 1,403 of the total population, 1 in 23 of the total mortality, or 713 per million living.

Thus the proportional mortality now was more than four times greater than it used to be half a century ago. In this respect its position was unique; no other disease could show anything like such an immense increase. It seemed certain that, if unchecked, cancer would ere long become one of the commonest diseases of modern communities. The subject was one that required thorough investigation on a larger scale than could be undertaken by an individual. It was a matter of national concern.

Mr. Williams then referred to the remarkable decline in the death-rate from phthisis and tuberculous diseases that had coincided with this great increase in the cancer mortality. It seemed to him exceedingly probable, from considerations derived from the study of the family history of cancer patients, that a large proportion of those thus saved from tubercle eventually perished of cancer and insanity, and he thought that the increase in the latter diseases had largely been brought about in this way.

In discussing the causation of these extraordinary occurrences, Mr. Williams said, although we were not in a position to solve the problem in a thoroughly scientific manner, that we need not be deterred on this account from formulating such explanatory conceptions as, after careful study of the subject, seemed likely to be useful. He thought it improbable that such conditions were directly ascribable to any single causative factor. The conclusion he had arrived at was that the increase of cancer had sprung out of impulses generated by the sudden and violent environmental changes associated with the transition from the agricultural to the industrial mode of life, which certainly was one of the most profound and far-reaching vicissitudes that the human race had ever experienced. Industrialism acted injuriously on the health of those exposed to its influence by inducing certain degenerative changes, which rendered those affected incapable of properly resisting tuberculous and other morbid excitations. He believed that defective cellular metabolism was at the bottom of these changes ; and this was the common root whence such diverse morbid manifestations as tubercle, cancer, and insanity sprang. In times of national prosperity the evil effects of industrial conditions of life were to a certain extent mitigated by sanitation, good feeding, etc. Thus many of those who had acquired morbid predisposition nevertheless escaped destruction. It was from these persons and their descendents that the great cancer army was constantly being recruited. Hence there was some truth in the curious paradox that a high cancer mortality was an indication of good sanitary conditions. No single factor was more potent in determining the outbreak of cancer in the predisposed than high feeding. He thought that the gluttonous consumption of meat, which was such a characteristic feature of the age, was especially harmful in this respect. Statistics showed that the national meat consumption had now reached the amazing total of 126 lbs. per head per year. When excessive quantities of such highly stimulating forms of nutriment were ingested by persons whose cellular metabolism was defective, Mr. Williams thought it likely that it might excite in those parts of the body where vital process were still active, such excessive and disorderly cellular proliferation as would eventuate in cancer. No doubt other factors co-operated, and among these he would be especially inclined to name deficient exercise in the open air.—*British Medical Journal.*

◆

HEREDITY AS A SOCIAL BURDEN.*

By A. W. Wilmarth, M.D.

FIRST ASSISTANT PHYSICIAN NORRISTOWN HOSPITAL FOR THE INSANE; LATE ASSISTANT SUPERINTENDENT PENNSYLVANIA INSTITUTE FOR FEEBLE MINDED CHILDREN.
NORRISTOWN, PA.

It may appear a waste of time to place before you proofs of the existence of heredity as a large factor in the production of those nervous diseases on which I wish to speak briefly to-day. My reason for doing so is two-fold. The existence of heredity as such a factor has been occasionally denied by men of such position that their opinion must carry weight, even though they are opposed by the majority of the thinking men who have given this matter their attention. The existence of heredity appears thoroughly established by statistics which have been most carefully compiled and verified. Moreover, the great number of these defectives, and the vast,

---

*Read in the Section on State Medicine, at the Forty-seventh Annual Meeting of the American Medical Association, held at Atlanta, Ga., May 5-8, 1896.—*Journ. of the Am Med. Assn.*

ever-increasing expense of their maintenance, as well as their harmful influence on society at large, can only be realized in this way. The three forms of disease which are most liable to make their victims dependent on society by rendering self-support impossible, or their society dangerous, are epilepsy, insanity and imbecility. In dealing with heredity in connection with these three forms of nervous disturbance, it is not reasonable to expect each condition to exactly reproduce its kind. The law of heredity is that each characteristic in the parents *tends* to reproduce itself in the offspring. Characteristics derived from one parent may be overcome by the influence of the other, and may even reappear a generation farther on, or be permanently obliterated, The three above named conditions are all simply evidence of degenerative changes of the nervous centres, dependent for their form on the portion of the brain attacked, and the age at which they develop. Brain trouble occurring early in life occasions imbecility; later, insanity; while epilepsy may complicate either condition or, rarely, occur independently. Almost any lesion or trophic change in the brain may occasion one or more of these manifestations of disturbed nervous action.

Let us look first at epilepsy as an inherited neurosis. The statistics being more accurate than in the other two diseases, for the reason that its symptoms are unmistakable, and thus friends can neither deceive themselves or others in regard to its existence. Even in uncomplicated epilepsy, if the spasms are at all frequent, the sufferer's power of self-support is lessened, if not entirely destroyed, and he becomes a burden on friends or the general public. Echeverria, after ten years' careful research in tracing the offspring of epileptics, has published the most valuable statistics on this subject that I have yet found. Excluding all cases which could not be fully verified, he found that 62 male and 74 female epileptics begot 553 children whose life histories were as follows: 22 were still born; 195 died in infancy from spasms; 78 lived as epileptics; 18 lived as idiots; 39 lived as paralytics; 45 lived as hysterical; 6 had chorea; 11 were insane; 7 had strabismus; 27 died young from other causes than nervous disease; 105 were healthy. Excluding the last three divisions we have 414 out of 553 who either died in utero or were affected with nervous disease, Could a more convincing story be told? He concludes that the marriage of epileptic women to non-epileptic men is more liable to result in neurotic offspring than when the conditions are reversed. He quotes one case when two epileptics married and out of five offspring two died of infantile convulsions, one from hydrocephalus, one lived an epileptic, and one was said to be bright. Of his 136 original cases 87 had parents with either insanity or epilepsy, while in forty-six cases epilepsy existed through three generations. One women had epilepsy from puberty to her marriage, which demonstrates that marriage may benefit epileptics, but of four children born afterward, two were epileptic and one paralytic. Dr. Knight, of Lakeville, Conn., in an address before the American Conferences of Charities and Correction, quotes a case where an epileptic mother bore fifteen children. Eight died in infancy, two were fairly teachable imbeciles, two were epileptics and three had sufficient intelligence to secure husbands and thus risk the multiplication of their kind. Dr. Landon C. Gray tells of an epileptic woman who bore nine children, seven of which died of infantile convulsions.

I studied the records of 500 epileptics at the Elwyn (Pennsylvania) school for the feeble minded during my residence there as a medical officer. Of these 149 were very incomplete. In the remaining 351 I found neurotic disease in 108 families on the father's side; in 106 on the mother's side; in 22 instances on both sides, or 236 families in all. In 19 other families some neurosis existed in brothers or sisters, but was not acknowledged farther back. From my personal knowledge of some of the families, I am sure that strict truth and the power to see "themselves as others see them" would swell these figures considerably. Insanity, imbecility and epilepsy with 56, 58 and 71 cases respectively, figure most prominently in this array of epileptic inheritance, chorea, paralysis, etc., forming the remainder.

The heredity of insanity is not so evident, nor is it so certainly transmitted to offspring, especially in neurosis of the same form, as is epilepsy. The reason for this may be looked for in the fact that many cases of insanity are the direct result of excesses, or other causes occurring in adult life. The transmitted effect manifests itself more frequently in childhood or infancy, and epilepsy or imbecility results. Or possibly we may find that incurable perversion of the moral nature, aptly termed "moral imbecility," which furnishes so much contention as to whether it should be regarded and punished as depravity or treated as a congenital absence of the faculty of moral control. A smaller number reach mature years before coming into their inheritance of misfortune and are classed as insane, and occasionally reproduce the parent malady with singular exactness. Savage, the eminent English authority, states the matter very concisely as follows: "Heredity produces some insanity, but is more likely to produce either mental defect or special and unusual forms of muscular, sensory mental or moral disorder." Nearly every systematic observer admits heredity as an etiologic factor in insanity, and while the most conservative statistics place the average from 20 to 25 per cent. of the cases observed, others place it higher and Kestevan says: "The most influential of causative conditions is heredity, and it is the most commonly suppressed by the friends." The truth of the last statement at least is indisputable. I wish to particularly emphasize the influence of heredity in imbecility and idiocy for the following reasons. They are the legitimate offspring of nearly every form of neurotic taint. Their extent and baneful influences are not realized by any one who has not given the subject very careful study. The census reports for 1890 and the natural increase would bring their number to between 90,000 and 100,000. This is far below the real number. So slow are parents to publish their children to strangers as feeble minded, that the late Dr. Kerlin, of Elwyn, Pa., investigated the matter. Out of 295 applications for admission to his school in 1880, 178, or 60 per cent., could not be found on the census enumerators list. How far this may apply throughout the country we can only surmise, but mothers are much the same everywhere, and are not willing to publish their childrens' defects.

There are two conditions in parents which figure largely in the production of feeble mindedness in children, tendency to neurotic disease and inebriety. These conditions are associated with the greatest frequency. Dr. Beach of England states that drunkenness is found in the ancestry of 38 to 40 per cent., of the parents of idiots (using the term idiot in its broadest sense). The Fourth Conference for the Care of Idiots in Germany agreed that inebriety was the principal cause of idiocy. In this country the Association of Medical Officers engaged in the care of the feeble minded agreed unanimously that a large per cent. of imbecility is due to the transmitted effects of alcohol and counseled, as did the German conference, more stringent legal restriction of its sale. It is well to bear in mind, in regard to these conclusions, that we can not draw too close a line between the habitual inebriate and the neurotic, for one class merges into the other and makes the distinction between cause and effect a difficult study. A cloud of witnesses testify to the transmission of neurotic taint in one or more of its many forms, to produce the multitude of imbecile and idiot children whose large aggregate number and marked increase is shown by every census. The largest and most complete studies on this subject have been made by Dr. Barr in this country and Drs. Beach and Shuttleworth in England. The work of these gentlemen is too well known to make any doubt of the great care exercised in the preparation of their tables, or the accuracy of their results, possible.

	Barr.	Beach.	Shuttleworth.
Total cases	1,044	1,080	1,200
	Per cent.	Per cent.	Per cent.
Insanity and imbecilty.	38.02	22.71	20.08
Other neuroses.	21.55	36.85	Incomplete
Total.	59.57	59.56	

If we accept the aggregate totals of Barr and Beach which are nearly alike we have nearly 60 per cent. of the families with more than one victim of nervous disease. These figures fairly illustrate the results of other observers. We can not go much into detailed cases, but I would like to quote Dr. Ireland in illustrating the persistence of this tendency to produce offspring of low grade in some cases. He cites an instance where four illegitimate feeble minded children were born to one defective woman from four different fathers. In another instance, under my own care, was a little idiot boy with the well-formed but lax and useless muscles in certain regions, which usually accompany the cerebral condition known as microgyria. His mother, a robust, high grade imbecile with no apparent physical defect, came to see him. She had married again and bore in her arms another idiot child very similar to his half-brother. A local physician assured me that they were certainly the children of different men, the second husband not having come to that region until after the birth of the first child.

Such is the evidence that tendency to nervous degeneration or instability descends from generation to generation, broken or interrupted perhaps by infusion of stronger elements, reappearing a generation farther on. What is their number and to what extent do they affect the welfare and progress of the public? Of epileptics, Dr. Knight, who has given their care much study, estimated that in 1892 there were, in this country, 19,000. They almost invariably drift into imbecility, dementia or other form of insanity, and are cared for, if cared for at all, under these heads.

Some children recover, but adults very rarely. They are ever liable to injury, which prevents their following many forms of employment. They are free to marry if they can find a mate, and there are very few who set out earnestly on that quest and are not very particular, who do not succeed and they leave as legacy to the public more epileptics. When subject to attacks of epileptic mania no class of insane are more dangerously violent.

The number of insane in the country will hardly number less than one hundred thousand. Probably there are more. It would be difficult to acertain the total cost of their support. We will look at the approximate cost in the largest two States which in 1890 contained about one-sixth of the population of the country, which will furnish some guidance to the possible expense in the whole country. In Pennsylvania, in 1894, there were 8,616 insane in institutions of all kinds, of which number 6,342 were in the six State hospitals and the private hospitals at West Philadelphia and Frankford. These 6,342 insane represented an expenditure of nearly one and one-half million dollars. The care of less than one-eighth of the State's feeble minded added $150, 000 to this large total. New York spent in 1893, for the care of her insane in public hospitals and for a small proportion of her imbeciles, over two and a half millions of dollars. Carry out this ratio throughout the country and the amount would be startling. The bulk of the insane are in asylums, for public safety demands this. Where are the feeble minded, who are found in European countries to outnumber the insane, and probably would here if properly enumerated? Not one-tenth are cared for in institutions. The remainder are in almshouses where their proper care is, in many cases, doubtful. Many are in homes where they monopolize their mothers' time and care, and elsewhere, where they are teased by children, abused by the vicious and live a strange life among their own people, with whom they have little in common. From the highest grades of imbeciles are recruited the ranks of petty criminals, prostitutes and tramps, who marry early and often, and who reproduce with the frequency of animals. Officers in reformatory institutions are becoming impressed with the idea that the majority of the younger criminals are permanently lacking in the higher mental traits, without which the development of moral character is difficult if not impossible. The growth of the burden on the industrious of supporting the helpless and the worthless may be better realized when we find that the New York State Board of Charities and Correction expended nearly eight and one-half millions of dollars in 1880 and nearly sixteen and one-half millions in 1890, although the population in that decade increased less than 20 per cent. Do you realize that the taxpayer may support, during a life of ordinary duration, members of three generations of these defectives? The remarkable increase in numbers in a family line of defectives and incapables may be best illustrated by quoting two instances. One, founded on the report of Miss Schuyler, President of the New York Charity Aid Society, of "Margaret, the Mother of Criminals," and progenitor of a family of paupers, beggars, prostitutes and criminals, which finally became a race of 700. Their family vigor was largely preserved by intermarriage with from vigorous families of ruffians, and some of the women bore at least twenty children, among which were numbered insane, epileptic and imbecile. I would quote briefly from Dr. Barr's exhaustive article on the influence of heredity on idiocy, the record of the family known as the "Tribe of Ishmael," where the descendants of one unclean, neurotic man traced through many years, "multiplied by consanguineous marriage into 250 families, numbering some 5,000 individuals, whose continuous criminal record has poured over the Northwest a flood of imbecility and crime." Nor do these instances stand alone. It is the salvation of society that at a certain stage of nervous retrogression nature appears to check further increase by making the most defective sterile and short lived.

The cost of human life through the insane each year is very large. Professor White, late of Cornell, places the number of homicides in the country last year at over 10,000. How many of these are due to insanity I will not pretend to say, but almost daily we read of suicides preceded too often by the death by violence of one, two, or even five or six people under circumstances which appear hardly consistent with normal mental balance. So frequent have such affairs become that only when some one of more than ordinary standing becomes the victim do they excite more than temporary local interest or arouse us to the danger which may be very near us.

The remedy for this state of affairs is a subject which demands earnest thought and radical measures for relief. The evil is so wide-spread, so thoroughly grafted in the every day life of society that to think of its immediate or entire suppression would be folly. It is time to attack the evil in some quarter. We can not expect relief from purely medical means. No more hopeless disease exists among the more common maladies than epilepsy in the adult. The relatively small number of "recoveries" in hospitals for the insane would be diminished if we subtracted the number who are committed to recover from alcohol, and other such cases who go out only to find their way back to some hospital later. Officers of institutions for imbeciles no longer look for restorations to normal brain power in large numbers, and even in such cases as leave the institutions there is a fear that their places may shortly be claimed by their children. He knows that the chief value of his work lies in the knowledge that the high grade imbecile is safer and the low grade and idiot more comfortable than he could be made at home. That he has relieved other children of association which would work harm and no good. He has relieved the family of an expense which deprived the other members of their due and the mother of a burden often too great for her. More than this, by enabling one person to care for perhaps five of these children, five families have been able to turn their entire efforts to ordinary social duties unhampered by such a burden as an imbecile child. Moreover, defective imbecile children should become the wards of the State until the danger of child-bearing is past. It is not so important with males. I need not explain why girls with strong animal passions and low mental or moral powers need such care.

It seems strange that our marriage laws should be so lax. The marriage of the unfit goes on unhindered. The epileptic may marry his kind and produce more of his kind. The drunkard, from a body thoroughly diseased, may cause any number of defective children to become the public wards to be supported by the more self-respecting and industrious. There is no legal preventive against the man whose father and grandfather have been insane, and who has been at some time, insane himself, from marrying a woman similarly afflicted and charging the bill to the public. The lunacy law of Pennsylvania expressly provides that a patient while still insane may go home for stated periods to resume all his family relations. It is time for a radical change in this condition of things. The excellent example of New York should be followed in other States and more accommodation provided for mentally and morally incapable women and girls. More stringent marriage laws should be enacted and enforced. The need of some such law was most strongly impressed upon my mind during my frequent observations of the mothers of feeble minded children, so many of whom, though not feeble minded were surely close to the line. So many had a different name from their child's, from remarriage. Possibly the fathers were the same, but this was not so evident. In one winter, out of five children who died consecutively, four of the mothers had contracted a second marriage. One woman who was said to be the mother of six microcephalic imbeciles, and had two of them in our care, once visited us and announced her intention of contracting another marriage. It is a well-established fact that a mother who has had a microcephalic child is liable to have any successive children similarly marked.

So long as this evil continues it is difficult to see how we may stop the constant increase of this class. Such marriages should be legally prohibited. While women, in every case fitted to fill the the post of wife and mother, hesitate before the responsibilities such a position entails, these women should not be allowed to assume such duties as they can never properly fill, at so great a public cost, for the mere gratification of animal instinct or a prospect of support. Such a law would not be unjust. The right of society to control all powers which militate against the general good ought not to be denied, and such a law judiciously applied would work no material hardship and interfere with no one's just rights. The marriage of an epileptic is a crime. It is almost absolutely sure to result in the birth of human beings foreordained to a lifetime of suffering.

On whom does the responsibility of righting these wrongs fall more heavily than upon ourselves. No one understands so well as we how surely the fruit follows the seed in these matters, and no one's word would have the same weight in molding public opinion to force proper legislation to this end. The marriage of the unfit should subject the perpetrator to punishment as surely as would any other offense against the public peace and morals. The whole body of the intelligent public would agree with us in this matter. The clergy would endorse such a move, perhaps excepting a few who are entirely unworthy of the vocation they have assumed, who disregard the divine warning that the consequence of the father's sins shall surely descend to the children and cheerfully assist, for a marriage fee, in perpetuating the evil.

These two measures, of providing safe and comfortable homes for the weak and preventing in some measure marriage among those who can only perpetuate and increase human suffering, poverty and crime, fall far short of fully solving the question, but they have the advantage of being practicable, and furnish, so far as I can see, the only radical method of presently reducing this class to its minimum number, for it truly attacks the evil at the root. We can not abolish human weakness and sin, but we can deprive it of the seal of the State and the Christian church.

◆

STREET CARS AND PUBLIC HEALTH.

THE ordinary electric street cars, as seen in most of our cities, are, without doubt, the greatest promoters of disease and ill health. The extremes of weather in our northern climate are such that it is quite impossible to arrange for the accommodation of patients from day to day. One day may be exceedingly hot and the next day may be cold and chilly. When once the open cars are put upon the lines they are usually kept there until the cold weather comes on permanently. Many cases of acute bronchitis in infants, youths, and adults have been due to nothing more than exposure from riding in public street cars. The corporations which control these accommodations to the public, and without which the suburban villages and the smaller cities would scarcely thrive, have as yet displayed little interest for the protection of paesengers against changeable weather. There is no reasonable cause for the various companies not taking measures to protect the people, upon whom they depend for the maintenance of their systems. They have a decisive advantage over the public, for should they withdraw their cars, the public would suffer the inconvenience, and there are very few citizens but who would risk health rather than lose the time that would be consumed in walking back and forth from their homes to their places of business. Not one in a hundred of the passengers are capable of affording carriages, and these are the only ones who could fight the corporations, and in a great many instances the only ones who can afford carriages are financially interested in the corporations.—*Med. and Surg. Reporter.*

HYGIENE VERSUS DRUGS.*

By C. F. Ulrich, A. M., M. D.

Wheeling, W. Va.

The American people have been called a medicine-taking nation. If the quantity of drugs prescribed by physicians, the masses of patent medicines, the barrels of so called home remedies, such as teas, decoctions, infusions and other monstrosities, swallowed by the American people, were ascertained, collated, arranged and published in a book, it would strike the reader dumb with astonishment. The fact that any human body can survive the injection of such an endless variety of vegetable, animal and mineral poisons as are poured into the patient and unresisting stomach and thence distributed throughout the various channels, acting upon the digestive organs, the circulation and the nervous system, proves that man is indeed "fearfully and wonderfully made," and has much greater powers of resistance than we could believe possible.

Let us suppose that an individual has what is commonly called a cold, which may be catarrh of the pharynx, the tonsils, the larynx, the trachea, the bronchi; it may even be an incipient pneumonia. This person tells his or her suffering to a neighbor, the neighbor replies: "Oh, I had that, and I took such and such medicine." Immediately the article is procured and taken. Another one comes in, hears the tale of woe, and recommends something else, this also is duly swallowed. By the time the gauntlet of the whole neighborhood has been run, and the entire catalogue of the domestic and the proprietary pharmacopeia has been exhausted, the patient has either recovered by virtue of his good constitution in spite of the horrible dosing, or the disease has progressed to a dangerous stage. In the former case, the wisdom of the neighborhood gossips or the excellence of this or that patent medicine is lauded to the skies; in the latter case the doctor is called in and is told they have given the patient everything that everybody recommended and having failed, they now call him in to try his skill. Thrice happy is the poor doctor if these busybodies have left enough constitution and vitality in their unfortunate victim to give him even a faint prospect of working a cure. If, however, owing to the exhaustion of the vital powers, or the general subversion of all the functions of the body by the heavy, indiscriminate and absurd dosing to which the poor sufferer has been subjected, the doctor fails to cure him, all the vials of wrath will be poured upon his devoted head by the would be doctresses in the neighborhood. If he thinks the patient requires rest from drugs and gives nothing, he is promptly discharged and another one called in, who will come up to their standard of excellence by ordering some kind of medicine to be taken every hour, or oftener. I have frequently been told when presenting a bill that certain visits should not be charged for, because I did not make the patient take medicine on those days. My answer would be that it required as much medical knowledge to determine when medicine is unnecessary as to know what remedies are required. It has often been suggested to me by my patients, or their families, that it is not necessary to come every day, but to return about the time the medicine is exhausted, in order to prescribe more. It does not occur to these individuals that the physician's duty is to watch the course of the disease, note its changes, assist nature in her efforts to bring about recovery, prescribe suitable remedies against unfavorable tendencies; in short to act as a kind providence to watch over the patient and promote recovery. They imagine the physician's business is to pour all sorts of drugs down the poor patient's throat and keep him constantly saturated with medicine. While engaged on the preparation of this paper, I visited one of my patients in the afternoon, whose medicine was exhausted in the morning. I found the family in terrible trepidation because he had not been dosed for six hours. The fever having abated, the temperature normal, the pulse regular, the patient free from pain, he was all the better for getting a little rest from drugs; but the family had suffered agony on account of my coming so late, and were on the point of sending a messenger to my house to inquire what was to be done. It is often necessary to prescribe a placebo in order to retain the patient. The physician who studies nature carefully, who makes himself thoroughly acquainted with the physiologic and pathologic processes of the human organism, acquainting himself with all the changes that take place in the interior of the body, both in health and disease; giving the proper remedy at the right time, and refraining from the administration of drugs when nature is doing the work for him, will be successful where success is possible; although he may sometimes confront the prejudices or the dense ignorance of his clients, and thus lose caste with some of them; but in time, it will be better, not only for the patient, but for the physician himself.

---

*Read in the Section on State Medicine, at the Forty-seventh annual meeting of the American Medical Association, at Atlanta, Ga., May 6-8, 1896.

I can call to mind very many families who had abandoned me for some new and more complaisant physician, who would prescribe large quanties of drugs, resort to a variety of mechanical methods, that he represented as new, convincing the family thereby that he possessed more knowledge and skill, who finally became disgusted with the meddlesome activity of the new man and returned to me, saying: "I like the old doctor best after all." Having said as much as is necessary about the pernicious use of drugs, let us see what we can offer as a substitute. Hygeia, is the ancient mythology, was the goddess of health. We call this divinity Vis Medicatrix Naturæ, the healing power of nature. To the diligent student of nature and physiologic processes in the human body, this divinity, Hygeia, assumes a greater importance than is generally attributed to her by the young and inexperienced practictioner. In a paper read at San Francisco in 1894, entitled "Cleanliness the Chief Antiseptic." I endeavored to show that the earnest and continued effort to prevent the development of bacilli and their entrance into the human organism, is of much more value in promoting health than the effort to destroy them after they have been introduced, or to relieve the system of the disease caused by their presence. This is the first consideration in the study of hygiene, which was fully discussed in that paper. But, as every physiologist knows (and every physician should be a thorough physiologist), there is a very complete apparatus in the human system to carry off, not only the waste material in health, but to dispose of the results of abnormal processes and of disease caused by the introduction of malignant bacilli. This consists of the various emunctories, as the large intestine, assisted in part by the entire alimentary tract; the urinary apparatus, *i. e.*, the kidneys, the ureter, the bladder, the urethra, the skin with its system of transpiration, *i. e.*, the sudoriparous glands and ducts. Now, although physicians know all about these, the masses are ignorant of the importance of keeping these emunctories in order, and many physicians are inclined to be careless in this direction. Bacteriology, antisepsis and abdominal surgery have so engaged the attention and called forth the enthusiasm of our modern practictioners, that the good old custom of investigating the bowels, the kidneys and the skin is often lost sight of. How much misery and suffering might be avoided, what an enormous quantity of patent pills and other purgative drugs would be rendered useless, and the sums of money wasted on them might be devoted to making the family more comfortable, if proper attention were paid to keeping the intestinal tract in good condition, which could be done without taking pounds of pills or swallowing gallons of medicine, by simply adopting a sensible and hygienic system of diet, by observing proper times for attending to the calls of nature, by never allowing other avocations or a false notion of propriety to interfere with the performance of that most important function. How much kidney disease might be averted by only introducing into the stomach such liquids as contribute to the preservation of the proper relations between the solids and fluids of the body. Here some one asks the question: "Shall we live like the beasts of the fields, drinking nothing but water? Shall we not pay some attention to the taste which nature has bestowed upon us, and enjoy the pleasant beverages with which the world abounds?" I do not propose to be severe; you may enjoy the pleasant beverages that nature, assisted by the art of man, furnishes you, but you must practice moderation; you must become acquainted with the capabilities of your organization; you must study the effect of these beverages, and stop before the point of deleterious influence is reached. When you see a man suffering from that deadly malady, Bright's disease of the kidneys, take it for granted that he has abused that great organ, whose function it is to rid the body of worn out and dead material. It is a very patient and long-suffering organ, that will submit to an immense amount of abuse; yet there is a limit to its endurance and it must eventually succumb. The skin, an inportant auxiliary to the kidney, can be kept in a healthy condition by attending to hygienic rules, If we promote perspiration by reasonable and moderate exercise, and by keeping the pores open through frequent ablutions, we will find much poisonous materials carried off that the kidneys would fail to dispose of. If these two organs, the kidneys and the skin, are treated according to the rules of hygiene, much disease will be prevented and the taking of enormous quantities of drugs avoided.

The stomach, that great work-shop, in which the first stage of converting food into tissue is accomplished, is as much abused as the kidneys and the skin. All kinds of incongruous, indigestible and injurious articles, under the false name of food, are forced into the long-suffering and much-enduring stomach; indigestion or dyspepsia, which brings in its train so many other ills, is the inevitable result. This was for many years the prevailing disease of the American people causing them to be distinguished by their sallow complexions and pinched features. The consequence is that the sufferer, not knowing what is the matter with him, resorts to all kinds of absurd medication, throwing the entire machinery of the body out of gear, thereby damaging the intellectual faculties and ruining the disposition.

There is not a more unfortunate creature in existence than the chronic dyspeptic, a source of misery to himself, to his family and to all who come in contact with him. Now, how is this to be prevented? Not by filling the stomach with drugs which, in many cases, act as a foreign body, or even as a poison. It can only be avoided by learning the requirements of the system, the ability of the stomach to dispose of the ingesta, and the peculiar characteristics of the food to be supplied. Another thing to be avoided is the unhealthy habit of bolting the food to gain time for business, neglecting mastication, an essential process in digestion, and swallowing the too often unhealthy food with such rapidity that it forms at first an inert mass and afterward ferments, producing gastralgia, acidity of the primæ viæ, with a long train of disastrous consequences. This is perhaps the most important branch of hygiene, and should be studied by every parent and by all the children old enough to understand it. The hygiene of drinking-water has been sufficiently discussed to require no mention here. Already intelligent housekeepers are filtering and boiling their drinking-water, and the remarkable absence of typhoid fever in our city show that this reform has borne good fruits. The hygiene of the lungs, the heart, the liver, etc., would require space enough for another paper; hence the example given must suffice.

The question may be asked: "What has all this to do with State medicine?" The answer is plain. Give all your working men and women, your employees in stores, offices, factories, etc., ample time to consume their food leisurely; let none but healthy teachers be employed in your schools; require every teacher to be well versed in the elements of physiology and hygiene and require them to teach these branches to the children who are old enough to understand them; devote a reasonable amount of time in the schools to physical culture; require the teachers to inculcate general rules of health into the minds of the pupils. Another thing I would recommend: Let schools for hygienic cooking be established at the public expense, to enable poor people to enjoy healthy food as well as the more prosperous. Much of this can be accomplished by intelligent legislation. If the rules barely hinted at in this paper be carried out by the more intelligent part of the community, and taught by precept and example to the masses, the unreasonable consumption of drugs will be reduced to a minimum, and the health, prosperity and happiness of our people will be more than doubled in a few years.

Department of Physical Education,

WITH SPECIAL REGARD TO THE SYMMETRICAL DEVELOPMENT OF THE BODY.

Edited by J. CLARK SLAY, M.D.

ACTION AND REPOSE.

THE well-being of the human constitution, mental and physical, is best secured by the alternation of action and repose. This truth should be impressed upon the minds of those who are vigorous and strong as well as upon those who are weak or in ill-health. To give advice for the preservation of health should be as much the duty of the physician as the care of the sick.

The proportion of exercise and rest, however, must be varied in accordance with the age, temperament and habits of the individual, but neither of them can be entirely omitted without impairment of health. Mere bodily labor without thought, or an object, is as little related to the due exercise of the entire system, as continuous study in a sedentary position is to the healthy development of the mind. Such professions or vocations that call for repeated, regular and varied exercise will be found to yield as a rule, the proper stimulus to the body, and the fittest pabulum for the mind.

It must be kept in view, however, that there is a wide difference in permanent effect between compulsion and voluntary action. The profession or vocation pursued, should be one that will control the attention, excite the interest, and create a feeling of responsibility, or it will not merit the name of occupation. Failures in health, as well as in professional and business life, more often result from lack of interest in occupation, perhaps, than from any other cause. Many weak, indolent men are made active and strong through interest of pursuit, while strong, active persons are frequently rendered indolent, and even invalids through want of interest in occupation. Every one, therefore, should be interestedly engaged. This being accomplished the faculties will expand with the occasion and the capacity for work increase with the taste for the employment. Many minor ills that assail the idle are merged and lost in the excitement produced by pleasurable occupation and in a state of activity, the mind, too, freely and cheerfully grapples with difficulties that quite appall the indolent.

All forms of exercise, however, whether in pursuit of business, health or pastime should be guarded. The ill effects from over-exertion are quite as great as those that result from indolence. Many people imagine themselves employed or taking exercise when they are making violent exertions, as is often seen in gymnasiums; from rapid, long and tiresome bicycle rides, and when running into danger or pursuing things distant and difficult without stopping to consider the ill-effects from over-exertion and the irregularity of excitement. On the other extreme we frequently observe those who are content to engage in quiet games, or the trifling practices of the arts which keep them midway between reflection and occupation. These are all very well as pastimes for convalescents from acute disease, or in cases where the intention is to gradually restore health and strength for the over-strained faculties but they can never be considered proper exercise, mentally or physically, for those already in health.

Rest at regular intervals, is quite as important as exercise for the well-being of the constitution, but the complete cessation from all work is not always the best means of securing it for those who are vigorous and strong. Change of occupation for a few hours occasionally, to something that calls into play different groups of muscles and gives to the mind new thoughts, will often be found to be the best form of rest for those who are in health. The complete rest that is secured by seven or eight hours sleep, out of the twenty-four, with short respites after meals, is generally all the actual rest required by this class of people. There are others, however, while not sick they are not strong. This class of people, of course, require regular and complete repose physically, and mentally so far as it can be secured, from all occupation.

THE RELATION OF PHYSICAL DEVELOPMENT TO INTELLECTUAL ABILITY.

Mr. G. W. West publishes* some interesting observations on the relation of physical development to intellectual ability, as shown by studies of the school children in the Toronto schools. The attempt was made to have the teachers group the children as to their mental ability into three as nearly as possible equal divisions of "good," "average," and "poor," basing their estimate not on mere class standing but upon observed natural quickness of intellect and assimilation of ideas. This was most interestingly found to be impossible as there at once appeared a disinclination to classify any pupils as dull. The other two classes were about evenly distributed. A similar experience was had in Worcester, where the teachers looked upon poor students as an implied reflection on themselves, and so had none.

The stature and weight of the children being recorded, groups were made for both boys and girls, with the result of showing that "the general rule is that the 'poor' children are more fully developed than the 'good' children." There were a few cases, generally near the latter end of the series, in which this order is reversed. In the case of girls' stature this is so at fourteen years, of boys' weight at thirteen, while for girls' weight it is at ten years. In boys' weight the "good" are the heavier from five to seven. The most striking difference between the two groups is in stature. The "poor" are the better developed throughout, except as before noticed. There is generally about half an inch difference in the averages in favor of the "poor" scholars. In the case of weight the difference is not so marked.

The reason given for these differences is that "the children of 'good' ability were probably so designated from their class standing, and their class standing was undoubtedly in many cases due to a greater amount of 'pushing' on the part of their parents. This would naturally mean a diminution in the amount of exercise, resulting in decreased rate of growth, while, on the other hand, their more sedentary life would result in a greater relative girth and consequent weight. The weight depending on the stature as well as on the girth, we have the reason for the less marked difference in weight between these two classes than between the same classes in respect to stature. The difference in stature is fairly constant; the difference in weight fluctuates considerably. We see here, from both points of view, the relative effects of insufficient and of proper exercise."

On the whole, from these observations, the author considers it safe to say that precocity bears an inverse ratio to bodily development.—*Boston Medical and Surgical Journal.*

---

* Science, August 7, 1896.

CYCLING IN HEALTH AND DISEASE.*

By E. B. Turner, F. R. C. S.

Cycling Accidents.

Their Character, Causes, and How to Avoid Them.

Cycling accidents may be divided into two classes—those which depend on the fault of the rider and those which do not.

Faulty Riding.

In the first category come all those "smashes" which are caused by the ignorance or foolhardiness of the bicyclist who allows his machine to get the better of him on a hill which he does not know. No one should ever allow himself to travel at more than five or six miles an hour descending any incline, however easy the gradient may appear, unless he can see the road clear to the bottom, and that no side lanes open into it, and that there is no sudden or abrupt turn. This rule should be absolute, whether a brake be attached to the bicycle or whether the rider, being an expert, trusts to his powers of "back pedalling" to control his pace. The greater number of dangerous hills on the main roads, and on many by-roads also, are safeguarded at the top by a warning notice board placed there by the National Cyclists Union or the Cyclists Touring Club, and riders ignorant of the locality should always on seeing this be prepared to dismount and walk. More accidents are due to reckless riding down hills than to any other caûse. Street riding through traffic is also a prolific source of accident. It is full of risk even to the practised, and in the case of the hundreds of novices who may now be seen daily courting destruction under the noses of the horses in London and other large towns it is simply criminal. The same remark applies to those who are foolish enough to ride "hands off." It is the easiest thing in the world to do, and, when indulged in for the purpose of silly display, is often the cause of a very bad fall. Any large stone, grating, or inequality in the road meeting the front wheel while swinging free causes it to be deflected from its true path, and the rider must then come to earth, face first.

Many accidents are also due to the fault—a common one—of not making sure that every nut and bolt in the machine is properly screwed up and in order before starting. It is especially important to be careful about this when the bicycle is new. For the first few rides it is "finding itself," and a spanner should always be put on every essential nut, and, if visible, the lock-nut of the chain, until the parts have properly shaken together.

Faulty Machines.

The accidents which are not due to the fault of the rider generally are caused by the sudden failure of some important part of the machine. This may be due to an unseen and undetected flaw in the metal—rare in the highest class of bicycles, but more or less frequent in those of the cheap description. Nothing can guard against this, except to take every precaution, and only use the goods of a firm which has a reputation to lose.

Early Eccentricities.

It is not necessary to treat of the mishaps of beginners; until it be mastered the bicycle has a miraculous gift of throwing its owner in the most unexpected fashion, and of running into every obstacle that lies in or near the road. This last eccentricity is easily explained by the fact that the steering follows the sight automatically, and a novice on wheels always intently regards that which he should avoid.

"Side Slip."

"Side slip" depends partly on the rider, and partly on an unavoidable combination of circumstances. If when the roads are "greasy" great care is exercised, and the machine kept upright and very steady at a moderate pace, it is often possible to escape without a slip, but sometimes even the most careful come to grief at a moment's notice. This is caused by the inflated tyre floating on the surface of the gluey mud, and never really getting a grip of the road surface; and if the road be "hogged," or the rider attempt an abrupt turn, the wheel slides away from under him, and he falls sideways without the slightest warning. There are many patent tyre covers invented for the purpose of avoiding this accident, but when the surface is really bad they are all equally useless, though when the conditions are less unfavorable they all have a certain good effect. A reckless, unskillful rider with bad "ankle action" can hardly escape disaster if he ride over "grease" at a fast pace. It is evident that a fall from this cause in front of an omnibus may very easily prove fatal, as the driver of the vehicle has no time to pull up. On a country road, though unpleasant, it is not often attended with serious injury. A fall sometimes results from an air tyre bursting and blowing off the rim of the wheel, which then collapses under the weight of the rider. This is more frequent in racing than in road riding. Many falls are caused by collisions with pedestrians, carts, cabs, and other conveyances. The exercise of due care will generally avoid an accident from these causes, but drunken and evil disposed drivers still exist who think it good sport to run down a cyclist. Judicious prosecution has of late years much reduced their numbers.

---

* *British Medical Journal.*

FRACTURES: "THE CYCLE GRAZE."

The injuries sustained from cycle accidents do not differ in any essential particular from those caused by other falls from swiftly moving carriages. The knees most frequently suffer, and the collar-bone is most often fractured—the fracture being in a large number of cases of the "green-stick" variety. Any one falling and hurting the knee should at once cease from riding until it is quite recovered. Much mischief has often ensued from riding home with an apparently slightly injured knee-joint. The "cycle graze" is very troublesome to heal. The two upper layers of the skin over some bony prominence are killed by the blow from the fall, and the resulting sore, if neglected, often remains open for weeks. Antiseptics at the time, and if possible some drying application afterwards, so that healing may take place under a scab, produce the best results. Always be careful that all the grit and dirt are washed out. Hæmatomata occur, and sometimes suppurate, from what seems a very slight cause, but the victim in such cases was probably travelling at a faster pace than he imagined. The directions for avoiding cycle accidents are few and simple. Be sure that, so far as you can ascertain, your bicycle is sound and in good order, and ride it with due care.

EFFECTS OF MASSAGE UPON THE CIRCULATION.*

DR. GEORGE OLIVER, in a recent lecture delivered before the Royal College of Physicians at London, gave an excellent summary of the effects of massage upon the circulation of the blood, which we quote from the *British Medical Journal* for June 13, 1896, as follows:

"The circulation of blood through the manipulated tissues is accelerated and increased. This fact has been clearly demonstrated experimentally on dogs and cats by Lauder Brunton and Tunnicliffe:

"'1. During the massage of muscles the flow of blood through them is increased.

"'2. Immediately after the cessation of massage an accumulation of blood occurs in the massaged muscles; this is rapidly followed by an increased flow through the muscles.

"'3. The massage of a considerable muscular area causes first a slight rise in the general blood pressure; this is followed by a fall which in some cases amounts to one-fifth of the initial blood pressure.'

"The results of my observations in man coincide with these conclusions. The local effects on the radial pulse are easily learned by applying the various forms of massage to the muscles of the forearm. The lighter and superficial manipulations, such as stroking, *effleurage;* and vibratory movements or percussion, such as hacking, punctuation, slapping, etc., raise the radial blood pressure and caliber; while the intermittent rolling and squeezing of the muscular tissue (*petrissage*) reduce them.

---

*Modern Medicine.

"The immediate effect of all the forms of massage is to raise the blood pressure and to enlarge the caliber of the artery. This preliminary stage is maintained for some time while the more superficial and vibratory manipulations are being employed; but it is very transitory indeed when that form of massage is applied which freely moves the muscular tissue, and is quickly followed by very decided and sharp reduction of the radial caliber.

"From this it would seem probable that the first effect of massage in its various forms—and an effect which is, moreover, maintained throughout the application of the superficial and vibratory manipulations when limited in duration—is to induce vasomotor contraction in the terminal vessels, and thus to raise the blood pressure and the caliber in the intermediate arterial tubing between them and the heart. This may, therefore, be regarded as the vasomotor tonic aspect of massage when that process assumes the forms of stroking, vibration, and percussion, which therefore raise arterial tension. When, however, the muscular tissue is freely manipulated and rolled, the vessels therein dilate, and the flow of blood through them is increased and accelerated by the rapid manipulations acting in the manner of a supplementary heart, and the blood pressure and caliber of the radial and other systematic arteries fall. This is the vasomotor relaxant effect of massage which reduces arterial tension. When the muscles of all the limbs are manipulated, the radial caliber and pressure fall. There may be perceived a large ictus after the manipulations, but it is unsafe to infer therefrom that the radial caliber is increased; for arteriometric measurement has shown that when the pulse tension is reduced, the pulse-stroke generally feels larger, though the caliber of the vessel is actually diminished.

"The diversion of the blood to the capacious periphery located in the muscles is no doubt a leading cause. But there is some evidence that points to the conclusion that this may not be the sole cause.

"When vigorous massage is applied to the back and the limbs for twenty or thirty minutes, the normal postural variations of the radial caliber and pressure are apt to become—if they do not invariably become—reversed, so that they measure less in the sitting than in the recumbent posture; and when this happens, it has been found that manipulation of the abdomen for eight or ten minutes restores the normal formula of the pulse.

"It would, therefore, seem probable that massage, when confined to the systematic muscles, disposes to the accumulation of blood within the capacious venous system of the abdomen. Glovetzky made a large number of experiments on men and dogs to show the effects of abdominal massage on the circulation. He found that the upper half of the body increased in weight after the séance, as shown by Mosso's balance, and plethysmographic measurements proved that during the sitting, both the upper and lower extremities increased in volume, but returned to their normal size after the massage. The blood tension and the intracranial pressure invariably rose during the massage, and the elevation lasted for a certain period afterwards.

"But though a short application of abdominal massage may restore the normal contraction of the vessels supplied by the splanchnic nerves, its continuance beyond a very limited period is apt to defeat the aim in view; for then it is not improbable either that the contractility of the vessels becomes exhausted, and dilatation of them is thus favored, or the heart's action is lowered through reflex overstimulation. So that it would seem to be best, as a rule, to apply massage to the abdomen in some of its vibratory forms, and for a brief period only, and after the general massage has been performed.

"*Massage and Exercise.*—It has been pointed out that in exercise—local and general—the volume of the limb is con siderably increased from the afflux, and probably also from the infiltration of watery fluid from the gorged vessels into the substance of the muscles. Volumetric observation of the arm has shown that massage, when applied for a short time—for example, from seven to ten minutes—generally induces a slight diminution of the limb. Therefore, it would seem probable that any watery exudation that may flow from the blood is pressed forward from the lymph spaces into the lymphatics.

"The practical outcome of these observations, which probably coincides in the main with the teachings of general experience in regard to massage, seem to be the following:

"Massage should not be prescribed and performed in a mere perfunctory routine fashion, as is to be feared it too often is, but, like other therapeutic measures, it should be applied with due discrimination. The leading features of the circulation are the best indications for the selection of the kind of manipulations to be adopted, for the limitation of the time of their application, and for the distribution of them, whether mainly to the viscera or to the systemic muscles. When, for example, the vasotonic effects are sought for, the manipulations should partake chiefly of the nature of vibration or percussion; and in those cases in which muscle kneading is resorted to, percussion should terminate the process. When, on the other hand, the aim is to reduce arterial tension and to relieve the ventricular effort, the deep movements should be preferred throughout, and should be applied only to the limbs and back, the abdomen not to be manipulated.

RESISTIVE MOVEMENTS.

"Certain exercises in which the operator offer resistance are of special value in the development of the muscles, and in the acquirement of muscular tone and vigor. This system of exercise to which I refer is known as the Swedish system. Nearly fifty years ago, Saetherberg, of Stockholm, applied this method to the treatment of heart disease, and reported his results some fifteen years later; and following him, one or two other observers have shown the value of resistive gymnastics in cardiac disease. But the method has only of late years acquired prominence as a definite therapeutic mode of treating failing compensation of the heart since the brothers August and Theodore Schott modified it in certain respects, and applied it under proper restrictions, either in conjunction with or apart from the baths administered at Bad Nauheim.

"The few observations to be adduced refer only to to the physiology of these exercises, or rather as to show the results which are believed by some to be obtained from them are brought about. Two somewhat conflicting theories are entertained. On the one hand, Dr. Theodore Schott ascribes it to reflex stimulation of the cardiac inhibitory nerves, causing the heart to beat more forcibly and more slowly; on the other hand, Dr. Bezly Thorne, Sir William, and Dr. John Broadbent, refer it to dilatation of the arteries supplied to the muscles. I have merely to submit a few observations on several healthy subjects, ranging in age from thirty-two to forty-six, which may be regarded as having a bearing on one of these views.

"In one case, that of a healthy doctor aged thirty-seven, the five arm movements were distributed over thirty minutes, the intervals of rest being equal to the duration of the exercises. At the termination of the first exercise, the caliber was found to be two points and the pressure ten points higher, but after each of the four subsequent exercises the caliber and the pressure were found to fall rapidly; and at the close of the observation, the former was found to be nearly 1 millimeter and the latter thirty points lower than the initial records. The frequency of the pulse fell from 88 to 82 (sitting).

"In another case of a healthy man, aged forty-six, subjected for thirty minutes to arm exercises, followed by forty minutes' rest, succeeded by the three trunk movements, there was also an initial rise of radial caliber and pressure, followed by a rapid fall; and after the long interval of rest this reduction was further intensified by the trunk movements. The pulse rate fell from 84 to 74 (sitting).

"In a subject aged twenty-six, the volume of the arm was measured before and after four arm exercises of two minutes each, interrupted by one minute of rest. The initial volume of 1648 c. cm. was increased to 1696 c. cm., and the increment was entirely removed by the application of massage for fifteen minutes, and was replaced by the resistive movements for ten minutes.

"It has been observed that the increased volume caused by the resistive exercises may persist for several hours. These observations in healthy objects have shown that the slow resistive exercises produce the following effects on the limb and on the radial pulse:

"1. An increase in the volume of the limb.

"2. At first a rise and then a decided fall in radial blood pressure and caliber.

"3. A reduction of the frequency of the pulse.

"The reduction of the radial pressure and caliber is no doubt due to the diversion of a large volume of blood to the capacious muscular periphery. The immediate increase of the volume of the limb is direct proof of this fact; but as in ordinary exercise, the persistence of the enlargement for many hours shows that it is not due entirely to the temporary filling of the vessels within the muscles, but probably arises from an infiltration of fluid derived from the blood into the muscular tissue. This system of regulative movements, therefore, produces all the local physiological effects of exercise; but it prominently differs from ordinary exercise in one respect; namely, in the slowing of the heart's action. In general exercise the condition of the radial artery does not truly indicate the degree of tension that exists within the central arterial system from the augmented propulsion of blood into it; for the blood pressure at the point of observation is reduced by the dilatation of the branches which at higher points convey the increased flow of blood to the muscles.

"In the early stage of exercise the radial tension is increased; but this is transitory, and is replaced by a reduction when the muscles begin to monopolize the blood supply. Exactly the same thing occurs as a result of the resistive exercises. As a matter of fact, it is known that in general exercise there is an increase of the mean blood pressure, notwithstanding the enormous diversion of blood to the muscles. But if the resistive movement method is but a form of exercise, why should it slow the heart while exercise accelerates it? It may be presumed that there is in both a rise in the mean blood pressure. According to Marey's law, there should be in both a slowing of the heart's action. In exercise it is obvious that the operation of this law is disturbed by other concomitant conditions, which determine an acceleration of the vascular pump, and the increase of the respiratory movements. Now, when the resistive exercises are practised, the greatest care is taken not to allow the movements to accelerate the patient's breathing, and he is directed to breathe calmly and regularly; so there is eliminated from this mode of exercise the main, if not the sole, cause of the acceleration of the heart which is invariably present in ordinary exercise; and the slowing of the vascular pump is just as likely, perhaps more likely to be due to a slight rise in the aortic pressure as to reflex cardiac inhibition (the theory of Dr. Schott). The former view, which was pointed out by Dr. Saundby, is more in accord with our knowledge of the physiology of exercise than the latter; and moreover, it affords a reason why the exercises are regarded by Dr. Theodore Schott and others as unsuited to cases of myocarditis, of aortic aneurism, and of advanced arterio-sclerosis.

"The examination of the radial pulse by means of the finger and of the sphygmograph affords but equivocal evidence bearing on this point; and from what we know of the anatomical relations of the radial artery to the muscles, and of the physiological influence of the circulation through the muscles on the radial tension, it becomes, I think, somewhat doubtful if the radial pulse can afford trustworthy evidence of any alteration in the blood pressure which may be induced in the large arteries by the exercises.

"It should be observed that the retardation of the heart's action, as well as the copious delivery of blood into the muscular periphery, must greatly limit and reduce any rise of arterial blood pressure that may take place. Hence these modulated movements throw less strain on the central arteries than ordinary exercise. The slowing of the heart is, therefore, a favorable sign; for it is an indication that the rise of blood pressure is being reduced by inhibition, and that the ventricle is not being subjected to an injurious strain by the exercises, and is duly responding to them in a more complete delivery of the blood.

"Doubtless the immediate relief to the loaded heart afforded by this therapeutic method should be ascribed to the aspiration of a large volume of blood into the capacious muscular periphery by means of the tonic contraction of all the systemic muscles, so gentle and so maintained as just to fall short of stimulating the respiratory center. The blood thus determined to the periphery must gradually return to the heart; and if the relief obtained is entirely due to this diversion of the blood, it will be of comparatively short duration. But there is some reason to believe that the volume of the blood is reduced during its sojourn through the muscles, and if the fluid withdrawn from the blood, lodges for some time in the muscular tissue, the intervals of relief should be prolonged.

"The total outcome, therefore, of the exercises is a transference of blood from the venous to the arterial side of the circulation, and a probable reduction of the volume of the blood.

"I think it is not improbable that under physiological conditions the ventricular output is not, as a rule, ample enough to maintain the normal volume of the blood in the arteries while they are being largely depleted by the increased drain into the muscles in a state of vigorous contraction; whereas, when the ventricle is dilated, which involves dilatation of the other chambers of the heart, and can be incited to throw off the augmented load of residual blood, the arterial tension may rise in spite of the increased flow into the muscles.

"This strictly physiological mode of developing and invigorating the walls of the heart, when applied with proper care and discrimination, is a therapeutic method of some value, and is a distinct addition to our resources for the treatment of failing compensation of the heart. I have observed several times that it has restored compensation after the complete failure of drugs, and that it is in suitable cases a useful auxiliary to other treatment. Like any other remedial method of decided power, it may do harm when inappropriately or improperly applied. In all cases I have found that the greatest caution should be exercised—especially in the early application of the method—to reduce the rate of the exercises to a minimum. There is often a disposition on the part of the operator to quicken the speed; this should always be deprecated unless such acceleration is fully warranted by the improvement attained.

"There is no reason why the principle which underlies this physiological method of treatment; namely, tonic contraction of successive groups of muscles, should not be attained in other ways and especially by mechanical means. Much may be done by the patient himself without an operator; and it has been found that auto-resistive exercises are useful in maintaining the advantage gained in the first instance, by the ordinary application of the method."

HOW TO BREATHE.

It is of the utmost importance to accustom one's self when walking to frequent intervals of conscious breathing. No involuntary action of the body is habitually so carelessly performed—so almost shirked—as this one, and upon no other does our health so largely depend. The great majority of the human race keep their lungs in a state of semi-starvation ; and diseases and ailments manifold can be traced to this cause alone, since the very act which deprives one of life-giving oxygen also returns to the arteries impure blood, weighted with poisonous carbonic acid.

If the lungs be properly inflated, this act alone gives the body a buoyancy, which increases the pleasure, and lessens the exertion, of walking. Of course a mincing or languid step must be avoided. Take a free and firm, but light, stride, balancing the upper part of the body alternately on each hip—but without swaying it perceptibly—and giving the impetus forward with a slight spring from the ball of the foot. Naturally, the mind will at first have to direct these motions, but the body responds delightfully to right ways of doing things, and if the exercise of walking can be taken where there is much of interest to divert one it will be found a great advantage, for this ready and cheerful response of the entire body, when its muscles are thus called into harmonious action, imparts a sense of exhilaration which makes one feel more like a bird than anything else can till flying-machines are accomplished facts.

The lungs have their own muscular power, which, unfortunately, is not more than half developed. The simplest preparatory exercise is full, deep breathing. Draw in a long, deep breath, expanding the chest as fully as possible without straining either lungs or muscles. Retain the breath thus taken while you count ten; then as slowly as possible, expel it. This conscious breathing will soon enlarge and strengthen the lungs. and the more frequently this conscious action can be made, the better for the lungs and the health.

Remember in all breathing exercises that nature's avenue to the lungs is through the nostrils, provision is made in the nasal passages to catch impurities and foreign substances, which, if carried to the lungs, as when breathing through the mouth, are liable to cause serious trouble. The very best time to practice lung gymnastics, is in the morning before dressing, and again at night, for the body should be free from all restraining clothing. Stand erect, with chin down, and rise upon the toes as you inhale ; hold the breath for a few moments, so that the air may act on the whole surface of the blood, nourishing it, and at the same time taking up impure gases, then expel it forcefully and as completely as possible, coming down on the heels at the same time. Five minutes of this work night and morning will work wonders.

If a proper carriage of the body be retained in all the ordinary duties of life, whether sitting or walking, it will be found to greatly minimize the fatigue of daily duties. It is the throwing of double work on some muscles by leaving others in idleness that causes more than half the pain of back and limbs which women suffer. If you walk up stairs properly, with figure erect, legs and joints flexible, breathe properly, it is a healthful exercise, which cannot harm even a feeble woman.—Maria Duncan, M. D., in *Progressive Age*.

◆

SOME VASSAR ATHLETIC RECORDS.

FROM the time of its foundation Vassar College has required of its students a certain amount of gymnastic exercise, both in the in-door gymnasium and in some form out of doors. In the earlier years horseback, riding was a regular part of the curriculum, every girl being taught horsemanship ; but the expense was found to be too great, and this training was abandoned. Tennis and the milder out-door sports soon took the place of the riding ; and during the last five years the advantages of the finely equipped new gymnasium have done much to advance the athletic powers of the students.

An interesting account of this side of the college life is given by Mr. Scoville in a recent number of the *Outlook*, and is a refreshing contrast to the former newspaper accounts of the number of pickles, pies and pancakes annually consumed. Tennis, basket-ball, swimming and bicycling are the popular sports at present, although golfing has begun to claim its votaries. According to Mr. Scoville:

"Another out-of-door recreation which seems to be peculiar to Vassar and Wellesley is 'birding.' 'Birding' (which, by the way, is used in a decidedly different sense at our male colleges), is usually indulged in at about sunrise, when the matin-song of the birds begins. Armed with opera-glasses, the 'birdists' steal through swamps and thickets, and, by studying the singers in their native haunts, acquire a far greater knowledge of ornithology than can be learned from books."—*Boston Medical and Surgical Journal.*

ARGUMENTS FAVORING A DEPARTMENT OF PUBLIC HEALTH.*

By Liston H. Montgomery, M.D.
Chicago, Ill.

Some of you, perhaps, may have views and ideas that are not entirely in accord with those of the writer. It is natural to suppose that some of us have hobbies or fads in medicine in general, the science of hygiene, or upon some branch of scientific study or research.

Emerson said, "Science surpasses the old miracles of mythology." It is with pardonable pride, therefore, that I offer this contribution and venture to briefly discuss this important subject which, as it appears to me, is one of the *most pressing needs of legislation that confronts us* and which our government can bestow and by so doing promote the welfare of the people of the United States.

It is a well-known fact that by the acts of our National legislators during the past few years hundreds of thousands of dollars have been appropriated and expended for agricultural pursuits including that of saving the cattle and other stock products that belong especially and distinctively to the farming interests of our country, and which we as sanitarians most heartily commend. But have you considered the proposition that during the professional career of thousands of members in our profession, not one dime has been appropriated for public health matters, to save or prolong the lives of human beings, and while our Marine Hospital Service has its duties to perform, it is nevertheless very circumscribed in character, and can render very little public service to the people inland, when cholera, for instance, or any other disease from a foreign country invades our shores, as was the case when this dreaded malady threatened New York City during the Summer of 1892 and the year following. The disease was stamped out, or more properly speaking, what was supposed to be cholera was prevented from making inroads to the interior by the State's laws.

But we are reminded that New York State, and the City of New York has facilities for caring for an epidemic which very few other States possess.

That the United States is constantly exposed to the importation of disease from foreign countries, and subject because of the facility and rapidity of inter-state transit to the rapid spread of infection and deadly germ infection of almost any city or town, is to the writer's mind something that ought not longer be tolerated by the patient people of this country.

While Philadelphia, Baltimore, Boston, New Orleans, Portland, San Francisco and our sister city Quebec, may be sufficiently provided for in this respect, there are numerous other cities on the Atlantic, Gulf, and Pacific sea-boards that are not as fortunate nor properly protected and equipped to bar out disease that has been imported should it gain a foothold.

I think this is particularly the case with our Southern sea-board cities. That they are not sufficiently prepared to combat the ravages of pestilential diseases that may invade them from some foreign country is a well-known fact to the practical sanitarian

---

*Read in the Section on State Medicine, at the Forty-seventh Annual Meeting of the American Medical Association, held at Atlanta, Ga., May 5-8, 1896.—*Journal of the American Medical Association.*

everywhere. This fact, lamentable as it is, has, to say the least, one specific cause, the absence of a department of public health. On the other hand we are well aware that the efficient health officer of the city of Charleston, S. C., and of other cities along the southeast Atlantic and Gulf coasts are as alert and equally efficient as health officials can be, but oftentimes they are hampered in doing thorough painstaking work toward suppressing a threatened endemic or epidemic.

What has our government done for the medical profession? Congress should do all in its power to advance the scientific interests of the medical profession and promote the welfare of the people of this country. Has this been done? Governmental aid in this respect is not lacking in several other countries with which we are in daily commercial intercourse. I believe the time has fully matured, and the importance to the public welfare in the matter of sanitation and health laws has arrived for our people to require, yea demand, that we are entitled to another branch of the Federal Government and portfolio to be known as the Department of Public Health with a medical secretary at its head, to be on the same plan or parity or dignity as is accorded to the other departments in the general administration of public affairs.

The consensus of opinion in this respect is wide-spread as will be noted by the following illustrations. This subject, to quote as near as I can recall them the words of the late Prof. C. G. Comegys, "Is not for promotion, welfare, or aggrandizement of the medical profession, but for *the welfare of the people* of a united country, the fairest the sun has ever shone upon," and to quote further from our late associate and worthy teacher, "Who is there that is more capable of judging of the welfare of our people, scientifically speaking, and I will add socially and morally than we who comprise the membership of this noble Association, representing as it does the hundred and twenty odd thousand physicians in the United States.?"

Why need our government wait for a threatened invasion or approach from Europe or other foreign land of some specific form of deadly germ or disease infection?

Why wait for the advent of small-pox from Mexico, or yellow-fever from the Spanish colony or States of South America, or the arrival on our border of some poor indigent immigrant sick nigh unto death with some form of pestilential disease, or until the germs of an infectious or contagious character have already made their appearance?

But some wiseacre (not a member of our profession) will say: "Oh, well, these cases will be quarantined or the maritime quarantine system will take care of them, etc." Scarcely two weeks ago the utter failure of this method was demonstrated at the City of Baltimore, Md., when there arrived several hundred immigrants at that port who had been exposed to small-pox or varioloid on board the steamship that brought them. The poor sick immigrant was detained, but the balance were allowed to pass through and take up their abode at their place of destination, many of them within three days arriving at Chicago, Ill.

While the maritime quarantine service does very well indeed and is a most useful system so far as it goes, yet it has no control in the inland and its power of authority is limited. Its system does not include all the ways and means of carrying into effect efficient prophylactic measures on a thoroughly scientific basis as should be done by scientific preventive medicine and thorough bacteriologic investigation beyond the few cities enumerated above. This system has no authority to carry out the enforcement where necessary of sanitary regulations, tending to prevent or abate the spread of epidemic or pestilential diseases, beyond the seaport places it has found lodgment and where it may be equipped for this purpose.

At the Pan American Medical Congress, the first congress of this kind ever held in the United States, which convened in the

City of Washington, D. C., in September 1893, under the auspices of our government, this subject was critically and thoroughly discussed in all its phases, heartily concurred in, and reported in favor of such a department, with a cabinet minister at its head.

The Chicago Medical Society, having a membership now of upward of 750 members, as early as the Summer of 1884 at the instance of the writer had a committee appointed consisting of seven of the most able sanitarians of that city, including the Commissioner of Health, to devise and formulate a plan, to urge the importance of National legislation upon this subject.

The committee submitted its report in September following and it was unanimously adopted.

The American Public Health Association at several of its annual meetings has heartily and unanimously concurred in this measure, and has appointed its special committee to confer with a similar committee of this Association to devise the best ways and means toward establishing this *sine qua non*, and much is hoped for in this direction from this influential body, at its coming meeting at Buffalo, N. Y., this September.

Various State, county, and municipal medical societies in a number of portions of the Union have within the past two or three years unanimously approved and adopted resolutions to this effect, and have heartily approved the bill now before Congress prepared by the special committee of this Association, to establish a department of public health.

STATE RIGHTS AND INTERFERENCE WITH STATE LAWS.

The possibility of interference with interstate authority I think is a subject too mythical indeed to require discussion.

Section 2 of our bill provides for the coöperation of State and municipal health authorities, hence no obstacle can supervene in the matter of inter-state or municipal boards of health and all will be of the most harmonious advisory nature and unanimity in character, with the one main object in view, the advancement and improvement in the welfare of the American people, the prolongation of human life, the physical and mental development of our citizens, and I might go farther by saying, the evolution of the human race by the diffusion and promulgation of scientific facts and treatises compiled from the best literature prepared by the most thorough scientific painstaking sanitarians of our country, thus promoting the physical health of our people and a correspondingly cultured intellectuality.

The following questions have doubtless been proposed to some of you already: Is there a degenerative tendency in our advancing civilization, in these days of the "new woman," hypnotism, bicycles, church affairs, etc., or is there a tendency for the rich of our Nation attaining a premature old age? Is insomnia, hypochondria, hysteria, dipsomania, suicide, insanity and cognate diseases including diseases of a tubercular nature on the increase?

I would answer in a general way. In certain geologic sections of our Union and among a certain class, most certainly this is true. We may ask ourselves then, what is the cause of this vital or mental change?

The miscellaneous statistics on these and kindred subjects to which I have had access, imperfectly as they are collated, unmistakably prove this.

If the government could see its way to rise to the dignity of having a department of public health and a medical secretary a man of well-known scientific attainments, as other nations have, statistics on this point could be made more reliable, and valuable scientific accurate investigation could be carried on in a methodic manner from the centre or fountain head.

In these days of specialism, the surgeon and the specialist receive for their professional services a fee which to my mind is greater and out of all proportion compared to that which the sanitarian or general practicing physician usually receives, or which he is justly entitled to.

While many of the ailments suffered by man are due to germs, morbid or toxic products or agents entering the system whether from food in any form, drinking water of polluted wells, rivers, lakes, etc., or germs of contagious nature, that enter the human economy through a wound, whether there be syphilitic, puerperal, tubercular, or sepsis due to other causes. The sanitarians of the medical profession in renewing their endeavors toward bringing about what this paper has for its object, again manifest their unselfishness in exerting their influence in the matter of a department of public health.

What we do ask after this proposed branch of our government has been established, is that it shall have equal dignity and rank with other branches of the government, and the secretary be a member of the Cabinet. In order to carry out our undertaking to a successful conclusion we must do so intelligently. We must be public spirited and with earnest zeal enlist with renewed effort the united profession of our country.

The reports of the special committee appointed by the Association in 1891 has submitted its report annually since, viz., at Detroit in 1892, Milwaukee in 1893, San Francisco in 1894, one year ago at Baltimore. Each year its deliberations have been unanimously approved and adopted, all of which is very gratifying to the committee, and tends to show that the committee is not, nor at any time has it been, remiss in the performance of its duties.

But our Association and our profession must do something more than adopt resolutions, all of which are good enough in their way. We must encourage the profession everywhere, and by concerted action urge upon Congress the necessity of this measure. That the matter has been successfully carried on thus far I think no one will deny. But the profession must not become apathetic. If our Eastern confrères should hold different views, let us persuade them to unite with us, for, I am convinced after careful observation and study, that practically the entire western, middle and southern members of our profession are a unit and endorse the bill now before Congress which was prepared by the committee of the American Medical Association having this matter in charge.

With this strong force united, and our eastern professional friends with us, with renewed efforts on our part and the combined support of the medical journals and newspapers, shall we not be able to convince our friends in both branches of Congress of the necessity of this urgent and needed legislation, for certainly our opinions on this topic are equally as valuable to public welfare, hygeia, and health as are those who have views upon finance, the tariff, the judiciary, theologic and ecclesiastic affairs, etc. The profession is too modest to claim more than this.

In reviewing the Constitution of our country, submitted September 17, 1787, and which went into effect in 1788, I find in the first or opening sentence the following lines:

"We, the people of the United States, in order to form a more perfect Union, establish justice, insure domestic tranquillity, provide for the common defense, promote the general welfare, and secure the blessings of liberty to ourselves and our posterity, do ordain and establish this constitution for the United States of America," etc.

Mark the words in the above clause—"establish justice," "promote the general welfare," "secure the blessings of liberty to ourselves and our posterity."

Is not this a sufficiently meritorious reason as provided in our Constitution to secure that which will prove to be a blessing to ourselves and posterity? And if so, are we not several years behind the times in the matter of this proposed department?

Is not the well-known and oft-quoted maxim which I will paraphrase, "*Salus populi suprema est lex*," a sufficient reason? Is it not sufficient to know that, for instance, where an epidemic of small-pox prevails, accurate information cannot be obtained by neighboring States or municipal boards of health from the medical officer in charge, or commissioner of health regarding said epidemic by his refusal to promulgate information desired when requested to do so?

All the foregoing illustrations are facts and matters of history, and not hypothetical queries, specific instances of which can be furnished if needed. All of which prove that Congress is in duty bound to provide this additional department.

IT SHOULD BE AN IDEAL DEPARTMENT.

To have this proposed department an ideal and efficient one, it should be under the direct and personal supervision of the medical secretary, who should not only be a graduate of a medical school and a man of letters, but a thorough sanitarian in all that this word implies, as well as possess an acquaintance with the requirements and needs of our own beloved country as well as those of foreign lands.

Genuine civil service reform should prevail in said department. The obliteration of the spoils system will mean a higher order of men. A spirit of *entente cordiale* will exist between all branches and schools of medicine and an *esprit du corps* will prevail also between the department, its secretary, and State, and municipal boards of health everywhere.

This department should have control over the poor and unfortunate immigrants that land upon our shores. An instance which came under my observation recently may aptly serve as an illustration. During the first and second weeks in April about 17,000 Italian immigrants arrived in New York. On April 17th five of these unhappy and unfortunate people were arrested by the police of Chicago and placed in the police station, charged with vagrancy and begging on the streets. These poor unfortunate aliens had left their native country scarcely four weeks previously. This is but a single instance out of scores of analogous cases that came under my personal observation during the past winter and spring months as an attaché of the Chicago Health Department. So that well may we ask what kind of citizens are we importing now? I am thoroughly convinced that a certain class of the illiterate and poorer classes of immigrants should be prohibited from landing on our shores—only to become a burden to us instead of a benefit to our nation.

NATIONAL VACCINE FARM, BACTERIOLOGIC LABORATORY, ETC.

Regarding this, and what might be regarded as kindred subdivisions of my topic, in the projection of sanitary improvements, etc., I will not attempt to discuss, nor more than mention, that they should be under the scientific observation of this department.

In concluding this imperfectly prepared paper, permit me to request of you to urge upon your representatives in Congress, your governors and others, in justice to the welfare of the people, in the name of science and humanity, the necessities and needs of our claim: That the medical profession and State medicine is broad and philanthropic and has made great strides and progress within recent years; that our medical representative or secretary will be a man of culture and intellect and *bon camaraderie*, thus assuring the profession and the world that our claim was not of the *ignis-fatuus* kind; that at some future time the United States will have an ideal department of health with influence that shall be unsurpassed, will be our reward, for which posterity will bless us is my firm and sincere belief.

THE
DIETETIC AND HYGIENIC GAZETTE
A MONTHLY JOURNAL OF PHYSIOLOGICAL MEDICINE

VOL. XII. NEW YORK, OCTOBER, 1896. No. 10

TYPHOID FEVER IN PHILADELPHIA.

By Henry Leffmann, M. D.

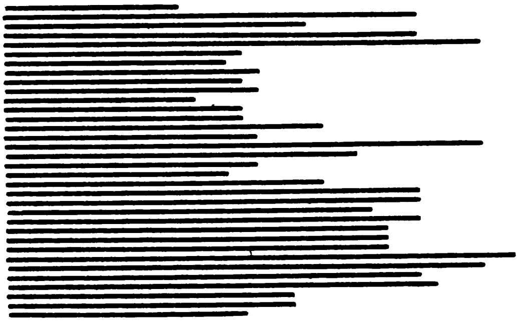
Many sanitarians consider that the typhoid fever statistics of a community may be taken as an index of its general sanitary conditions. More exactly, however, we may say, that in the absence of special evidence to the contrary, a high typhoid fever rate is dependent on polluted water. The value of statistics increases greatly when large numbers are under consideration. The study of the mortality reports of a large city, over a long period, will always be found useful, especially if corrected with accuracy and presented in intelligent form.

The mortality reports of the city of Philadelphia correspond to these requirements. They have been for many years collected with as much accuracy and fairness as is possible under the present systems of city government. The records are kept in admirable order and the annual reports of the Department of Health are clear and comprehensive. The systematic arrangement and publication of the statistics dates from 1860. The classification of diseases and the tabulation by wards are somewhat antiquated but do not affect the purpose in view in this article.

The mere inspection of figures, however, is either unsatisfactory or misleading. Statistics must be analyzed if their significance is to be shown. The death-rate from a particular disease in a large city may be low, but upon examination it may be found that the cases occur abundantly within a particular district. This has been for many years true of Philadelphia typhoid fever. There has been a tendency to excessive rates in particular districts, and it will be found possible to account for the local developments by reasonable theories.

For many years, only the typhoid fever deaths were reported. About ten years ago, the Board of Health began to require the report of all cases. This has been an advantage in giving early indication of local epidemics, but the medical profession at large is not thoroughly in accord with the authorities on this point, and many cases do not get reported. On the other hand, few deaths are missed, indeed, it is probable that a few deaths are reported as from typhoid fever, for want of a more exact diagnosis, but those may compensate for some that may be reported as due to intestinal hemorrhage or other incident of the disease. It will be safer, then, to take the death-rate as the guide, indeed, as just noted, it is alone available for the earlier period.

The first diagram shows the total deaths for the years 1861 to 1895, both inclusive. The noticeable features are the high figures during the war, and in the year, 1876. The war figures are at once accounted for when we recall the large



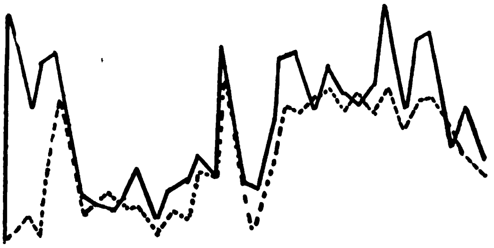
number of army hospitals established in the city during that time. The greater proportion of deaths were those of soldiers taken ill in the field. That this inference is quite safe, will be shown later. We notice, then, that as the influence of the war passed away, the death-rate dropped to quite a low figure, until 1876, when there was a sharp rise due to the large number of strangers in attendance on the international exhibition. There is little doubt that many of these cases were caused by the defective water-supply of the exhibition grounds. In some respects the sanitary engineering of that exhibition was disgraceful. The rate falls at once after the exhibition-year but soon increases and, with much irregularity in detail, remains for the most part high. In 1889, a change was made in the water-supply of one district of the city, which was much to its benefit. The old Kensington water-works, which for years had been pumping into the mains a highly polluted water, was dismantled and the statistics that will be given show with great force how beneficial was this change.

It will be a mistake if we assume that all typhoid fever deaths are caused by polluted water. In spite of the frequency of this disease and the probability that it is due to microorganisms, bacteriology has not given us definite information. Specific organisms can be obtained from the bodies of those affected by the fever, but there is still reasonable doubt as to the existence of a constant form in water. Many of the published statements claiming the recognition of the *bacillus typhosus* are untrustworthy. Numerous epidemics have been traced to milk, many of which, it is true, have primarily arisen from polluted water, but solid foods may also be the source of contagion and probably other still undescribed methods. When, in any large community, a generally distributed disease-producing influence exists, such as a polluted water, local and transient influences are unnoticed. In Philadelphia, for instance, the water supply maintains over the whole city a tendency to typhoid fever. It is not likely that if a pure water were introduced, the disease would entirely disappear, but the few cases due to milk, defective drainage, etc., would stand out distinctly and their causes be ascertained. Turning to the details of the statistics, we find that for many years the general death-rate, that is from all diseases, has been low in Philadelphia, but that the typhoid fever death-rate has been high. I began to study the mortality tables in 1885 and prepared a paper which was published in *The Polyclinic* in 1886. Since then I have almost continuously watched the reports. The totals for each year in comparison with other cities show how unsatisfactory is the Philadelphia record.

Comparison of deaths from typhoid fever in some large cities:

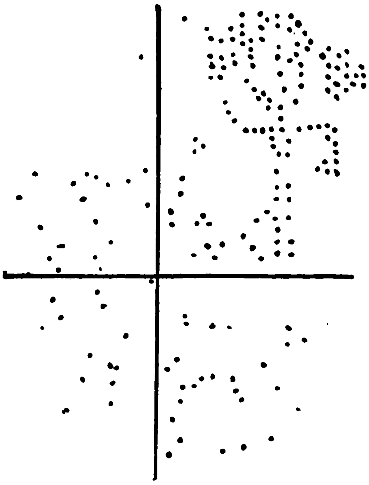
	Deaths per 100,000.		
	1893.	1894.	1895.
New York	20	17	17
Chicago	42	31	32
Philadelphia	41	32	40
Brooklyn	17	15	16
London	16	15	
Paris	25	29	
Berlin	9	4	
Hamburg	18	6	
Munich	15	2.5	

I have noted above that the high death-rate during the years of the civil war was due to the large number of soldiers brought to the U. S. hospitals. This is clearly shown by the second diagram in which the distribution of the deaths between the two sexes is exhibited. We see how large the proportion of deaths of males. At the close of the war many families from the South settled in the city, and as newcomers are always more liable to such diseases than old residents, there was a large number of cases which affected both sexes nearly equally. The death-rate then became lower and showed no striking features until the "centennial" year. There was nothing to give a preponderance to either sex, and the figures are nearly equal. In the later years the death-rate of males always tends to be high. I am not able to explain this feature, except to say that Philadelphia as a manufacturing city contains a considerable number of male artisans of foreign birth, and these are more susceptible.



Death rate from typhoid fever in Philadelphia from 1861 to 1895, both inclusive. Continuous line, males, broken line, females.

We get more information by studying the distribution of the deaths. Unfortunately the Board of Health adheres in its publications to the old-fashioned and absurd method of classification by wards which are mere political limits without topographic value. For a year or so a system of classification by sanitary districts has been in operation, but the statistics thus prepared are in the form of charts which are not published. To obtain the topographic data for years prior to 1895, it is necessary to go over the records in the registry bureau, and I am indebted to Mr. J. V. P. Turner, the Registrar of Vital Statistics, for affording me abundant opportunities for consulting these records. The first topographic map is a reprint of one published by me in 1886. It shows the location of the deaths occurring during the last six months of 1885, omitting those in the outlying districts and a few of uncertain location. It will be noted at once that the north-eastern section of the city is most seriously infected. The district in which these numerous deaths occur includes 16, 17, 18, 19 and 31 wards, and is in several respects peculiar. For brevity I shall call it the "Kensington district." It is notable for its textile industries, especially carpet weaving. The industries have grown up very rapidly, mostly since the war, and there are some local causes which tend to increase the death-rate. It has, however, become clear that polluted water had much to do with the condition. For many years the Kensington district was supplied by water pumped from the Delaware river within the bounds of the district itself. Just above the pumping station was the mouth of a creek, of the foul character so familiar to American cities. This creek drained the territory to which was supplied the water pumped just below its mouth, so that the inhabitants were constantly drinking their own sewage. When the general mortality of the city was tabulated and various districts compared, it was found that the Kensington district, which included approximately one-fifth of the city's population, yielded about one-half of the typhoid fever deaths. This state of affairs continued for several years until the city authorities were finally brought to recognize the necessity for abandoning the pumping station at that point. In 1889,

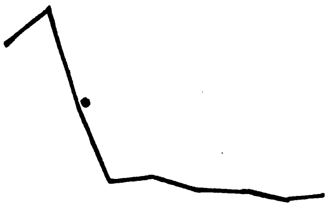


Distribution of deaths from typhoid fever in Philadelphia July 1 to December 31, 1885.

only a limited amount of water was pumped, and in 1890 the station was dismantled. The sanitary benefit that resulted is well shown by the following figures:

Wards	Years 87	88	89	90	91	92	93	94	95
16	61	43	24	5	9	6	7	4	5
17	28	40	28	4	5	6	5	7	3
18	22	27	19	3	12	8	11	8	5
19	43	66	30	32	23	25	17	20	26
31	27	35	25	9	8	5	9	7	8
Totals,	181	211	126	53	57	50	49	46	47

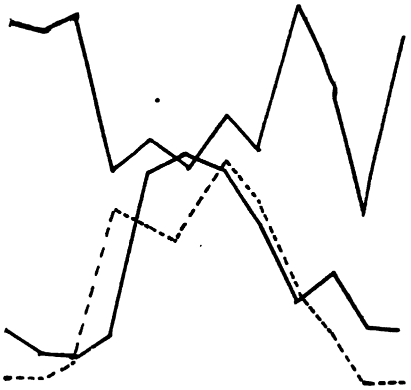
The area of the above district is about three square miles, almost all built up; the population about 150,000. The fall in mortality is also shown graphically by the annexed diagram. The influence of the polluted water is shown still more strikingly when we compare the death-rate from month to month in 1889 with the amount of water pumped and the general death-rate of the rest of the city. This received Schuylkill water, by no means pure, but generally better than that supplied to Kensington.



Graphic representation of fall in mortality coincident with change of water supply in Kensington district. The dot represents the point corresponding to year 1889 when a part of the supply still came from the Delaware.

Months in 1889.	Deaths outside of Kensington.	Deaths in Kensington.	Water pumped in 1,000,000 gal.
January. . .	56	6	0
February	52	3	0
March.	58	3	10
April	36	5	173
May.	45	19	149
June	29	21	131
July.	49	19	196
August	38	15	171
September. . . .	61	9	101
October . . .	51	12	49
November.	27	6	0
December.	60	6	0

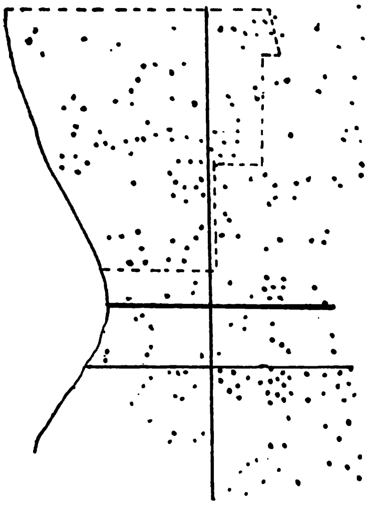
These data are also shown graphically by the diagram in which



The upper continuous line shows the variations in the number of deaths in that part of the city supplied by Schuylkill water, the lower continuous line the deaths in the Kensington district, and the broken line the pumpage of the Delaware water in millions of gallons.

When this objectionable pumping station was abandoned a change had to be made in the distribution and the district went from the worst to the best supply in the city. It was put on system supplied by the East Park reservoir which has a capacity of several days supply and in which, therefore, the water gets a little opportunity for subsidence. That the benefit was not temporary is proved by the fact that a low death-rate has continued for six years as the table and diagram clearly exhibit. On the other hand, a large district of the city, otherwise in good sanitary condition, has become decidedly infected by reason of being supplied with Schuylkill water by direct pumpage, that is, without any reservoir facilities. This district reaches approximately from Callowhill Street to Lehigh Avenue, and from 10th Street to the Schuylkill River. These bounds, of course, mean nothing to those not acquainted with the city, but the district is one that ought to have a low typhoid death-rate for it is mostly on high well drained ground, the houses are of good construction, not overcrowded, and the inhabitants largely of the better class. An important evidence that the water supply is at fault is furnished by the experience of Girard

College. This occupies about twenty-five acres in the centre of the direct pumpage district and has a population of nearly two thousand. It is supplied entirely by the direct pumpage, but all the water that enters the institution is filtered and the result is that, although the cases of typhoid fever occur abundantly outside the college walls, the disease is practically unknown within. A map is herewith shown in which the influence of the direct pumpage is exhibited.



Distribution of typhoid deaths in 1893. Broken line shows bounds of direct pumpage district.

The statistical and topographical data, therefore, show with sufficient clearness that the high typhoid death-rate in Philadelphia is due to the use of polluted water. There are, of course, minor and local conditions which are independent of this cause, but they are mostly lost sight of in the general condition. There is every reason to believe that if the present water supply of the city were subjected to filtration, an immediate fall in the typhoid rate would be shown, and under such circumstances the sanitary condition of the city would be in the front rank of the large cities of the world. Apart from the advantage of better health, the comfort of the residents and visitors would be much increased. The disgusting character of the water, especially in the direct pumpage district, where it is almost always highly turbid, has led many citizens to purchase water for drinking purposes or to put in house-filters, and it appears that the death-rate would be decidedly higher if such protection were not in vogue. The pecuniary value of good water has often been dwelt on. If we suppose that each typhoid case costs $100—a not too high figure—we will have an interesting calculation. The deaths from typhoid fever in Philadelphia in 1895 were 469. It is safe, I think, to allow a ten per cent. mortality which will give 4,690 cases; at $100 each, the cost will be $469,000, the interest on a sum quite sufficient to filter all the water.

THE HYGIENE OF WATER.

By John W. Hill, C. E.

Ladies and Gentlemen:—When I accepted an invitation to talk to you to-day upon the Hygiene of Water, I hoped to be able to present some ideas and illustrate some facts connected with this very important question, which would be of use to you in discussing the subject with the younger minds under your charge, in the public schools. Whether I have accomplished anything in that direction will be for you to determine.

After much study of the influence of waters upon health, I am convinced that among other diseases which may be attributed to polluted waters, that grave disease, typhoid fever, is wholly due to the use of infected waters, generally to an infected drinking water. There may be other immediate causes for typhoid fever, but an infected or typhoid-tainted water is the original and constantly acting cause, and is responsible for our continuous typhoid fever rates. Oysters, water-cress and other edibles, eaten uncooked, which are known to have been the cause of typhoid fever epidemics, have acquired the infection from sewage polluted waters. Sewage is water carrying a large amount of dissolved and suspended solid matter and bacteria, among which may be the germ of typhoid fever.

If I am correct in this assumption, then safety from typhoid fever is to be had only by procuring our supplies of domestic water from sources beyond the reach of sewage pollution, or if this is inconvenient or impracticable, by so purifying such water as may be available, until it reaches a high standard of quality, before we drink it or use it for certain dietetic purposes.

Other diseases than typhoid fever are known to be caused by the drinking or use in some other manner, of an infected water, but typhoid fever is the principal and most important disease, and if our domestic waters do not contain the typhoid infection, we can safely assume that they are free from all other zymotic taint.

In connection with waters which may be wholly destitute of suspended and dissolved organic matters and free from bacteria, but at the same time, very hard, like some deep well waters and spring waters, it is proper to remark that such waters, while free from sewage pollution, are still open to objection, when viewed from another standpoint.

An excess of lime, magnesia, sodium or potash in our drinking waters may imply no danger in early life, but as we grow older and the capacity of the system to eliminate the excess of salts from the blood, becomes weaker, a disposition of these surplus salts will take place in the arterial system, especially in the capillaries and smaller blood vessels, rendering them stiff and brittle, and increasing the chance of rupture from the ordinary pressure of the circulation, and by shocks.

From such cause may occur partial paralysis and other physical disturbances, due to an impairment of the capillaries and smaller blood vessels. Soft, pure water is therefore better for drinking than hard, pure water, especially for those persons advanced in years.

Being interested in the influence of sewage polluted waters on the continuous typhoid fever rates of our larger cities, and believing that prompt and effective measures are demanded in nearly every large community to remedy the existing evils of our public water supplies, I shall devote my time to-day to a few remarks upon the connection of public water supplies and typhoid fever, and on the more practical methods for improvement of sewage polluted waters.

Typhoid fever is now known to be caused by a microorganism called by its discoverers, Drs. Eberth and Robert Koch, Bacillus typhosus, or the typhoid bacillus. The typhoid bacillus is an entity as much as a potato, or an apple. It has form and dimensions, and certain peculiarities of growth serve to distinguish it from all others save one or two closely allied bacteria.

It has a life history and grows and generates its kind by fission, that is, the short rod forming one bacillus grows in length and separates into two rods, each of which grows in length and divides again, and so on, until eventually one of these small, round-ended rods becomes the parent of millions of millions.

The rate of growth of the typhoid bacillus is not known with certainty. But some other bacilli have been carefully studied for rate of growth, and these have been found to increase from a single rod or cell to upwards of seventeen millions in twenty-four hours. The typhoid bacillus has a much slower rate of growth than this, but a single germ will, within a day, grow into millions.

Cultures of the typhoid bacillus, within a few generations of the original source, viz.: a human spleen, frequently contain long, wavy threads, each of which separates by fission into a number of rods of the usual length of the individual bacillus.

During the early stages of illness from typhoid fever, numbers of the bacillus are given off by the patient through the alvine discharges, and find their way into the sewers of our cities, and from the sewers into the rivers and lakes, which constitute the sources of water supply for so many of the large cities of the world.

It is now quite definitely settled that the typhoid bacillus does not act directly to produce typhoid fever, but that it elaborates a specific poison from the food materials which it finds in the human intestine. This poison, absorbed into the system, produces the well-known symptoms of typhoid fever.

The product elaborated by the typhoid bacillus (in artificial cultures) has been carefully studied by Brieger, a celebrated German chemist, and by others abroad, and by Dr. Victor C. Vaughan, of the Michigan State University. This product has been shown by numerous inoculations of the smaller animals, to have virulent properties. The precipitation of the poisons produced by bacterial agency involves complex and expensive chemical processes, requiring great skill and patience upon the part of the analyst, and our limited information upon the chemical aspect of what is known as "typhotoxin" is probably due to this fact. The toxalbumin produced from its food materials by the action of the typhoid bacillus, must not be confounded with the "ptomaines," which are produced by certain of the putrefactive bacteria operating upon dead matter. The typhoid bacillus is without doubt a true "parasite," and finds its normal habitat in the human intestine.

The poison produced by the typhoid bacillus from the food materials which it finds in the ileum of a patient, is absorbed into the circulation and then follow the clinical symptoms characteristic of typhoid fever. Considering that the pathogenic properties of the typhoid bacillus are due to its poisonous products, and that the virulence of all poisons is measured by the dose, it is sometimes held that the introduction of a small number of the typhoid bacilli, into a human stomach, can have no injurious effect. Without doubt, the rate of production of "typhotoxin" will depend upon the number of the bacilli introduced, and the virulence of the poison will depend upon the nearness of the source of the germ. But from our present knowledge of the mode and rate of growth of the bacillus it is not difficult to conceive of a single rod becoming the progenitor of millions within a few hours or days, if incubated amidst favorable surroundings.

It is sometimes asked if a certain water, of which we all are drinkers, contains the typhoid germ, how it is that some of us escape the infection. This opens the way to a field of inquiry as boundless and interminable as the other question, from whence came the typhoid bacillus originally?

The problem of susceptibility to typhoid fever is very difficult to solve. Undoubtedly certain people are at some time,—some perhaps at all times, proof against the attack of the typhoid bacillus. If it were not so, during epidemics all persons exposed to the infection would have symptoms of the disease. Knowing that this is not the fact, we naturally reason from it that some of us are not susceptible to the infection.

But it is not possible by any known test to separate a body of people into two classes, one of which contain those who are susceptible to typhoid fever and the other class those who are immune; and it is always safe to assume that any of us are or may become susceptible to typhoid, and we should regulate the quality of our drinking and dietetic waters accordingly.

Under certain conditions of health all of us may be immune, under altered conditions of health some of us may be susceptible. Any conditions surrounding us calculated to derange the circulation and lower the general vitality, may render some of us susceptible to the disease. Living in and inhaling an atmosphere of sewer gas or of an atmosphere deficient in oxygen will quickly act upon the circulation and reduce our powers of resistance to typhoid fever, and perhaps to all other infectious diseases. Sewer gas is deficient in oxygen, and oxygen is essential to the purification of the blood as it circulates through the lungs. The continued respiration of an atmosphere deficient in oxygen, will result in an impoverished circulation, and an impoverished circulation will be more or less susceptible to the influence of zymotic poisons.

Returning now to the original proposition that typhoid fever is a water-carried disease, and that cities having water supplies of high chemical and bacterial purity have low typhoid fever rates, while cities having water supplies of low chemical and bacterial purity have high typhoid fever rates, I will first direct your attention to the typhoid statistics of ten cities in Europe, having what are known to be water supplies of excellent quality, and compare these with ten cities in this country having what are known to be water supplies of poor quality, and then let you decide whether it pays to supply a city with water which shall be the very best attainable by practical means.

The figures quoted are taken from the registers of vital statistics for the year 1895, and give deaths by typhoid fever, per 100,000 of population living:

EUROPE.		UNITED STATES.	
Berlin	5	Chicago	32
Munich	3	Cincinnati	36
Hamburg	9	Cleveland	36
The Hague	5	Washington	74
Rotterdam	2	Pittsburgh	77
Stockholm	9	Jersey City	71
Christiania	7	Louisville	77
Vienna	6	Indianapolis	97
Dresden	5	Philadelphia	40
Breslau	9	Buffalo	29
Average,	9		56.9

You will notice that the average rate for the cities in this country is 9½ times the average rate for the cities of Europe.

Comparing Rotterdam, the city on the list having the lowest rate, with Indianapolis, the city having the highest rate, it appears that the chances of taking and dying from typhoid fever during the past year was 47½ times as great in Indianapolis as in this old city of Holland.

Now something with reference to the kinds of water supplied by these several cities. Berlin draws its public water supply from the Lakes Muggel and Tegel, the former an enlargement of the River Spree, and the latter an enlargement of the River Havel. Hamburg draws its water from the River Elbe. Rotterdam draws its water from the River Maas (one of the mouths of the Rhine), but in each of these cities the water is carefully filtered and brought to a high fixed standard of purity before it is allowed to go into the public mains and reach the consumers. Munich obtains its water from mountain springs in the Mangfall Valley. Vienna obtains its waters from mountain springs in the Schneeberg. The Hague draws its public water supply first from a system of driven wells and afterwards filters it through beds of very fine dune sand. Stockholm draws its public water from lakes and wells. Dresden takes its water from a system of driven wells alongside the River Elbe, and Breslau uses filtered water from the River Oder. The source of supply for Christiania is unknown.

Of the American cities, the sources of supply for Chicago, Cleveland and Buffalo are lakes into which millions of gallons of raw sewage is being poured every day; while Cincinnati, Philadelphia, Washington, Pittsburgh, Louisville, Indianapolis, and Jersey City take their public water supplies from rivers which are the channels of discharge for the sewage of many cities. No attempt is made by any of these cities to remove the noxious properties from the water before it is delivered to the consumers.

When comparisons are made of the typhoid death rates of cities in Europe with cities in this country, the claim is sometimes urged that the people of Europe, and especially of Germany, are not water drinkers, that beer is their usual beverage, and upon the other hand, that the people of the United States are not beer drinkers, but water drinkers, and therefore more exposed to water carried infections. When it is stated that the Hague has a typhoid death rate of five per 100,000 of population, this is not to be taken as an evidence of the high quality of water supplied to the city, but as an indication that the people of the Hague generally do not drink water, and depend upon beer or some other manufactured beverage.

This expression of doubt by some that water may be so purified by artificial means, or may be naturally so pure as to largely diminish the probability of one contracting typhoid fever by drinking it, suggests inquiry along three lines:

1. Is the water supplied to certain foreign cities such as to reduce the typhoid fever rates or inhibit the disease,if it were generally used as a beverage?
2. Is the water generally used for drinking in the larger cities of the United States such as to be the probable cause of our high typhoid fever rates?
3. Is it true that the people of London, Berlin, Hamburg, and other European cities are largely beer drinkers, while the people of Boston, New York, Cincinnati and other American cities are largely water drinkers?

It is not possible to answer the first question directly. Despite the great chemical and bacterial improvement by sedimentation and (or) filtration of certain polluted waters like that of the Elbe at Hamburg, and the Maas at Rotterdam, one cannot say positively that such waters, even after treatment, will not contain the typhoid bacillus, or be the carrier of infection to some; and we are compelled to measure the improvement in quality of such waters by their influence upon the health of the people who use them.

In regard to the quality of water supplied to the people of certain cities in Europe, it should be manifest, if this was not to be used as a drinking water that a very large annual expense could be avoided in those cities by pumping water direct into the reservoirs or street mains from any convenient source without attempting in any manner an improvement in its quality before it is distributed to the consumers.

Water of high hygienic quality is not required for the sprinkling of streets and lawns, for the extinguishment of fires, for the flushing of sanitary apparatus, for steam boilers, and many other uses; and if the water is not to be used for drinking and other dietetic purposes, great care and expense in the selection of a source of supply, or in efforts at improvement of the quality of water is surely wasted.

Considering that over ninety-eight per cent. of the consumption of water by any large city is for purposes wholly unaffected by its hygienic quality, it would seem very singular indeed that a city like Berlin (for instance) should be at an extra expense of ten dollars per million gallons, to fit the water for drinking purposes before a gallon of it is permitted to go into the public mains. This great cost for purification of the water from Lakes Muggel and Tegel is not necessary if the water is to be used only for street sprinkling or other purposes apart from drinking and the requirements of the cuisine. Moreover, the water from Lake Muggel, after it has passed through the filters at Frederichshagen, is chemically and bacterially as pure as many natural spring or deep well waters which are known to be altogether safe for drinking purposes, and chemically and bacterially pure or nearly pure waters are not needed for any of the many uses of water, excepting for drinking, cooking, and the washing of uncooked articles of diet. No one would propose an elaborate and expensive treatment of a polluted water unless some portion of it was to be drank.

The water of the River Elbe, when it reaches Hamburg, is of sufficient purity for all ordinary purposes, but the most modern works upon a large scale for the improvement of polluted waters have recently been devised by that city, and these works are carefully operated to reduce the noxious properties of the Elbe water before it is distributed to the citizens. This work of purification is not intended to make the water better for the great majority of uses to which it is applied, but to make it a water which the inhabitants can drink with the least risk of infection from typhoid fever and other water carried diseases. If it were a fact, as some are disposed to think, that the people of Hamburg do not drink water, why should that city be at such great effort and expense to render the water of the Elbe fit to drink, before it is permitted to go to the consumers?

But the most pronounced efforts to procure a supply of public water which certainly shall not be the cause of infection, is found at the Hague, where the water is first obtained from wells driven in the sand dunes and afterwards passed through filters of sand, the grade of which is finer than that of nearly every other city which has adopted sand filtration. The water of the Hague as it comes from the driven wells in the dunes very likely is equal to that of any of the driven well waters, which we are accustomed to drink with a feeling of perfect security. But the officials of that city, not content with a water which at its source is far superior to nearly all of our public waters, set about to improve the hygienic quality of this water by slow filtration through beds of fine sand, with the result that their city has had for many years nearly the lowest recorded typhoid fever death rate of any of the large cities of the world. Are we to ascribe this low typhoid rate to the drinking of beer, gin or Schiedam schnapps, by the people of the Hague, or shall we ascribe it to the drinking of this exceptionally pure water from the public mains?

The average typhoid fever rate for Cincinnati during the past six years is about ten times that of the Hague.

From such information as I have been able to obtain, it is altogether probable that in the consumption of beverages other than water, we are quite abreast of the people of this old Dutch city, and the only certain difference in the conditions surrounding the two cities which would affect the typhoid rates, is found in the quality of their respective public water supplies.

It is not difficult to answer the second question. Nearly all the water supplies of the large cities of this country are polluted with household sewage, and are the carriers of the typhoid bacillus from the sick to the well. Having knowledge of the fact that many of our large cities are daily drawing water for drinking and other purposes from sources of known sewage pollution, we look upon the typhoid rates of such cities as the natural result of this indifference to one of the first laws of health, viz.: a pure drinking water.

In regard to the third line of inquiry, I am not able to state the per capita per annum consumption of beer by many of the larger cities of Europe, but the greater consumption is accredited to Munich, which for one year used 128 gallons per capita. An investigation of the probable consumption of beer by the larger cities of this country reveals the startling fact that even the very correct city of Boston, consumed sixty-five gallons of beer per capita during the year 1894, while Cincinnati indulged itself to the extent of eighty gallons per capita, and Milwaukee, for the same year, reached the respectable figure of 105 gallons per capita. Of a list of ten of the larger cities of the United States, the lowest per capita per annum consumption for the year 1894, was forty-six gallons, and the highest (Milwaukee) with 105 gallons. The amount of beer made and drank in the United States for 1894, allows nearly sixteen gallons for every man, woman and child of the whole population. We all know that large quantities of beer (and other artificial beverages) are made and sold in this country, and we know that these are not substituted for the industrial and sanitary uses of water. From the limited information at command, I am sure it would be a mistake to assume that the people of Europe drank nothing but beer, or that the people of this country drank nothing but water.

Now a few words upon the partial purification of sewage-polluted waters. The methods which have given such excellent results in cities of Europe, are generally sedimentation for a few days in large reservoirs, combined with slow filtration through beds of sand; and in some situations like that of Berlin at Lake Muggel, where there is usually but little turbidity to the water, the water is pumped direct from the lake to the filters.

Sedimentation is accomplished in reservoirs which will hold from a day to several days' supply. While at a state of rest in these reservoirs, much of the suspended matter which imparts color to the water will be precipitated and form layers of mud on the bottom and sides of the basin.

While a few days subsidence of a turbid polluted water may have no large influence upon its quality, it will remove much of the suspended matter which otherwise will clog a sand filter and reduce its term and efficiency of service.

Careful study of the subject of sand filtration has led to the opinion that it is possible to have the sand so fine and the rate of filtration so slow that, theoretically, all suspended matter, including the bacteria, will be arrested on or in the sand bed. But this would require enormous areas of filter surface, with limited commercial efficiency, and the cost of water so obtained would be prohibitory on a large scale.

In order, however, to approach as nearly as practicable to the ideal condition of filtrate at a reasonable cost, it is desirable that all the heavy matter should be removed by subsidence before the water is put on the filters. Hence the use in the water-works of London, Hamburg and other foreign cities of subsiding reservoirs in which the water is stored for several hours or days before the process of filtration begins.

Of the many schemes proposed for the filtration of polluted waters upon a large scale, all worthy of consideration can be grouped in three classes:

1. The so-called continuous sand-filter, as exemplified in the filter beds of the London, Berlin and Hamburg water works.

2. Intermittent sand-filtration as illustrated by the filter proposed by the Massachusetts State Board of Health for the city of Lawrence.

3. The rapid mechanical sand-filters used only to a limited extent by cities in this country, which require a coagulant to make them effective in the removal of the finer suspended matters and bacteria in the water.

The continuous sand-filter of European practice consists of a shallow reservoir with inclined or sloping sides when made with earthen walls, or with vertical sides if made of masonry. The surface area of these reservoirs ranges from an acre or less to as much as two acres. The depth of the reservoir is ten or twelve feet, according to the local conditions of the water, the materials available for the filter beds, and the views of the designer.

In the bottom of this reservoir are placed a system of lateral parallel drains which collect the water from all parts of the filter and conduct it to one or more main central drains by which it is removed from the filter to the clear-well, and from this it is pumped to distributing reservoirs, or direct into the distributing mains.

Over the drains in the bottom of the filter is laid a course of broken stone or large gravel about twelve or fifteen inches thick, over this a layer of small gravel six inches thick; over this a layer of coarse sand fifteen to eighteen inches thick, and on top of the coarse sand is placed a layer of graded sand from twenty-four to thirty-six inches thick. This upper layer of sand is the real filtering material, all the layers of sand and gravel below simply being beds for the support of this finer bed of graded sand at the top of the filter.

The water will stand in the filter just before it is taken out of service at depths varying from three to six feet over the surface of the sand bed. This depth being determined by the greatest head under which it is desired to have the filter work.

The capacity of a filter is stated as the average number of gallons which it will deliver per acre per day during the time it is in service. When the filter is new and the sand surface clean, the rate of delivery will be quite up to the average rate even with a few inches of water depth over the sand, but as the sand becomes clogged with the suspended matters in the water, and by the products of bacterial action upon the organic matter, the head of water on the sand bed must be gradually increased to filter the water at or near the standard rate, until in due time the limiting head is reached and the rate of delivery of the filter diminishes until it is no longer profitable to operate it, when the water is shut off from it altogether and the filter taken temporarily out of service.

The upper layer of graded sand is then carefully scraped for a depth of about half an inch, the dirty sand removed and washed by mechanical apparatus devised for the purpose, and stored in the sand house preparatory to putting it back on the filter whenever the successive scrapings have reduced the thickness of the upper sand bed to fifteen or twenty inches. The thickness of the upper layer of sand is seldom reduced to less than fifteen inches, and the lower layers of sand and gravel are not disturbed or renewed at all unless some radical overhauling of a filter is shown to be necessary by the bacterial analyses of the water.

During the time of service of such a filter, it is acting continuously without interruption day or night, and the rate of delivery is maintained either by manual labor or automatic regulating devices as near to an established standard as possible.

The rate of delivery will depend upon the fineness of the sand in the upper layer, the head of water on the sand bed, and the condition of the water when it comes to the filter. Neglecting the grade of sand and head which are capable of manipulation, it can generally be said that the rate of operation will depend upon the condition of the water. Therefore when filters are operated in connection with subsiding reservoirs, or where the work of purification is a process of filtration combined with sedimentation, the larger the amount of work done in the subsiding reservoirs, the finer may be the grade of sand used and the higher the rates of delivery of the filters per unit of sand surface. The fine sand will insure an improved quality of filtrate, and the higher rate of delivery a reduced cost of treatment per million gallons of water.

It is not possible to make a sewage polluted water fit for drinking purposes by subsidence alone, excepting the water is permitted to remain in a wholly quiescent state in large deep reservoirs for many months or years, a condition altogether impracticable for most cities; while subsidence for a few hours or days will reduce the suspended matter and silt in most turbid waters to a state which will admit of the use of fine sand in the filters, and rates of delivery higher than the average of European practice. In the subsiding reservoirs of the Hamburg water works, according to a recent communication from Mr. Schroeder, the chief engineer, the Elbe water is allowed to rest for nineteen to thirty hours before it is drawn off to the filters. The Engineer Commission on the Improvement of the Water Works of this city, proposed a rest of the river water in subsiding reservoirs for four days before it was drawn off to the filters.

The intermittent sand filter designed by Mr. Hiram F. Mills, C. E. for the Lawrence, Mass. water works, differs principally from the sand filters of the European waterworks in the mode of operation.

The sand bed is of finer grade than the average of European filters, is 60 inches thick, and is assumed to act in the purification of water for the whole depth.

In the continuous sand filter substantially the whole work of purification is accomplished at or near the surface of the sand bed. The "Schmutzdecke," or dirty cover, which is regarded by foreign engineers as an essential and evidence of proper sand filtration, is not regarded as of special importance in the intermittent filter. In this, it is assumed that the organic matter in the water is reduced by the action of the bacteria in the bed of sand to nitrous and nitric acid, which unite with the bases in the water, forming insoluble and harmless nitrates or nitrites. This work is chiefly accomplished by the nitrifying bacteria, discovered by Winogradsky in the soil at Zurich, and by Dr. Jordan and Mrs. Richards in the sewage at Lawrence, Mass., but the ordinary water bactéria, are, doubtless, also useful in breaking up the organic matter in water before it is acted upon by the nitrifiers.

The intermittent filter receives the water for a number of hours or days, and then rests for a number of hours or days, until the water held in the sand bed has drained away, and the interstitial spaces of the sand bed filled by air. When it is again supplied with water as before.

Thus, while the action is intermittent from day to day, it otherwise is continuous in operation, the scraping and cleaning of the sand being only such as can readily be done during the short intervals of rest.

The theory is that the filter is capable of continuous renewal, by the forces within itself, and the large periodical expense required to restore the sand bed of the continuous filter to its normal condition, is materially reduced. Enough is not known of this system of filtration to express an opinion upon its adaptability to other waters than that of the Merrimac River; and both in the bacterial results and the typhoid rates of Lawrence, since it was put in service three years ago, it fails to attain the high standard of efficiency reached by the continuous sand filters of Europe.

The attractive feature of the mechanical filter is found in the very high rates of filtration per unit of area of the sand bed. While the continuous filter of Europe works at rates varying from 1,500,000 to 3,000,000 gallons per acre per day, and the intermittent filter of Lawrence works at a rate of 5,000,000 gallons per acre per day; the mechanical filter works at the prodigious rate of 128,000,000 gallons per acre per day. This type of filter is not used in any of the public water-works abroad, and from the sentiments of the English and German Engineers, is not likely to be, until it is definitely settled that no possible harm can result from the use of chemicals in the filtration of polluted water.

The successful operation of the mechanical filter, depends upon the use of alum or some other agent which will act as a coagulant and assist in the interception of the suspended organic matter and the bacteria, by the bed of coarse sand, with which this type of filter is furnished. By the use of alum in these filters good results have been had in the reduction of bacteria, but whether upon the whole there has been any real improvement in the quality of the water remains to be seen.

Viewed from the standpoint of practical efficiency in the reduction of typhoid fever death rates in cities where this type of filter is used, it does not appear that it has accomplished very much. In the report of the Engineer Commission previously referred to, the typhoid fever death-rates of five cities in this country, which have been using water from mechanical filters, are compared with the rates of five cities in Europe using water from the continuous sand filters, with an average for the year 1894, for the American cities of 60.9 deaths per 100,000 of population against 7.6 deaths per 100,000 of population for the foreign cities, that is, or the American rate was eight times as great as the foreign rate. The average typhoid rate for these cities using the mechanical filter in combination with alum is higher than that of many cities in the country which make no effort at all toward purification of their public water supplies.

According to Mr. Harold Collett, an English writer upon this subject:

"In the decomposition of the sulphate of alumina, the sulphuric acid acts upon with the carbonates in the water, which are precipitated as sulphates, converting carbonates into sulphate of lime, magnesia, potash, etc., while the alumnia forms with the suspended organic matter and bacteria a gelatinous combination which is slowly precipitated in quiescent water, or is arrested by the sand of the filter.

"The decomposition of the sulphate of alumina depends not upon the amount of suspended organic matter in the water, but upon the amount of bases, as carbonates of lime, etc., and any surplus of alum will remain undecomposed in the water. Upon this theory of reaction there can be no free sulphuric acid resulting from the use of alum in the purification of a polluted water, because the decomposition of sulphate of alumina will be in proportion to the bases in such water, and not in proportion to the organic matter, which is sought to be precipitated. Therefore a water high in suspended organic matter and low in bases,}viz.: a soft, polluted water like that of the Ohio River,is not capable of purification by the alum process. If, upon the other hand, as is asserted by some exponents of the use of alum in the filtration of polluted waters, the decomposition of alum is in proportion to the amount of suspended organic matter in the water, and not in proportion to the bases, then with a water low in bases and high in suspended organic matter, while the precipitation of the organic matter might be satisfactory, it would be attended by an addition to the water of free sulphuric acid. Either view of the alum processes suggests their lack of adaptability to some waters requiring purification for drinking purposes."

In Germany and Holland, where the practice of sand filtration has been brought to a high state of perfection, the use of alum or any other coagulant in the purification of waters for domestic uses is tabooed, partly from the feeling by the authorities that water so treated is lacking in hygienic qualities, and partly from the practical difficulties connected with the use of such water for laundry and some other purposes.

With reference to the use of mechanical filters in combination with a coagulant, it is obvious that any process for the improvement of polluted waters, must be of such character that it will operate only to remove objectionable matters, and not substitute one danger for another.

While certain of the large cities in this country have better public water supplies than others, few of our cities are supplied with waters which should not be condemned as unfitted for drinking and dietetic purposes, and every one of these cities should be compelled by public sentiment to advance the hygienic quality of their waters until our continuous typhoid fever rates are as low or lower than the larger cities of Europe.

Realizing that devices which will reduce the dangers of polluted waters by eighty or ninety per cent. have been fully exploited abroad, and that typhoid fever is an evidence of sewage pollution of our public water supplies, one cannot avoid the conviction that every death from this disease is a crime for which the municipality is responsible.

Every city which continues to supply a typhoid tainted water without an intelligent and earnest effort at abatement is guilty of a barbarism, not tolerable in this age of enlightenment and progress.

Typhoid fever should not exist, and with the knowledge of the means for its reduction, no city has a right to supply to its helpless population a water which is bound to carry disease and death into many households.

SOME ADDITIONS TO OUR VEGETABLE DIETARY.*

By Frederick V. Coville,

Botanist, U. S. Department of Agriculture.

Up to the present time chemistry has shown in a general way what substances are required for building and repairing the body, for keeping it warm, and for making it work. It has shown, too, approximately, what amount of lean meat, flour, sugar, etc., ought to produce the desired result, but it has not yet shown in detail what kinds of these various types of food will suit the taste, digestion, and physiological needs of particular persons or particular conditions. An exclusive diet of salt meat and beans in the arctic region produces the physiological condition known as scurvy. In some parts of the country a diet of corn bread, bacon, and molasses has been persisted in to such an extent as to produce a widespread and almost chronic condition of biliousness. The conclusion from such cases is that in the selection of foods we must take into account the appetite, power of digestion, and physiological peculiarities of the individual; in these matters each man is necessarily his own judge. There seems little doubt, in general, that a wider use of green vegetables in the dietaries of most of our people, particularly those with healthy digestion, would be a marked benefit.

---

*From the Year Book of the Department of Agriculture, issued February, 1896.

OIL FOR FUEL, GREEN HERBAGE FOR MUSCLE.

In the year's diet of wild herbivorous animals, the fats and the carbohydrates, principally stored in seeds in the form of oil and starch, furnish the chief foods in autumn, and on them the animals fatten providing themselves with the necessary store of bodily fuel for the winter. In the spring, when they have usually exhausted this stored fat, their principal food is green herbage, and upon this they renew their muscular vigor and general vitality. A similar yearly routine prevails among savage races, as illustrated by many tribes of our Western Indians. So far as the naturalness of a diet of green vegetables is concerned, there can be no doubt that it formerly was and that it still is adapted to the requirements of the human body. But since the beginning of civilization the food of mankind has come to be more and more artificial in character, until foods are now selected more by custom than by instinct. The habit of eating salads and boiled green vegetables, commonly referred to as pot herbs or greens, is much more prevalent in Europe than in America, and to the lack of this kind of food, it is believed, is due in large part the reputation of Americans as a bilious race. Of course, like all nations, we eat a large amount of plant food, but by far the greater part of it is derived from seeds, roots, and tubers.

WHEN TO GATHER POT HERBS.

All pot herbs are properly gathered in the early period of the plant's growth, when the green parts are relatively rich in formative and nutritious materials. The percentage of protein compounds in the dry matter is then large, compared with its later stages, for the plant at this time is engaged in the manufacture of the substances necessary for its own later development, which are largely similar to those required in the building up of the human body. It must be borne in mind, on the other hand, that more than four-fifths, by weight, of the substance of green vegetables is made up of water. Care should always be taken in gathering or selecting pot herbs that the plants are young and have not become tough and stringy by the transformation of their formative materials into cellulose or other indigestible or perhaps deleterious substances. In preparing them for the table they should be boiled, the time varying from only a few minutes, in the case of a very succulent and mild plant, to two and even three hours, in the case of a plant with thick, firm tissues or containing a bitter principle. The latter defect must be removed by long boiling and the repeated changing of the water. The details of cooking are the business of the cook, and in the following pages only such references to this subject will be made as are especially called for by some peculiarity of a particular plant.

SWISS CHARD (BETA VULGARIS).

This variety of the common beet has been cultivated and selected in such a way that the principal development of the plant takes place in the leaves instead of the root. The plant is sometimes called, therefore, leaf beet and sometimes spinach beet. After sowing in spring the plants are thinned, like beets, and well supplied with water. In late summer, autumn, and in more southern climates, in early winter, the leaves are in condition for use. The leaves of the ordinary beet are also used as a pot herb, but only in spring and early summer. Beets when raised for their roots are sowed in drills, and as the plants increase in size the rows are thinned to the proper extent, the young plants being pulled from time to time, roots and leaves together, for boiling.

CHARLOCK (BRASSICA SINAPISTRUM).

This plant occurs as a weed across the northern part of the United States, from New England to the State of Washington, and is most troublesome in regions like Wisconsin, Minnesota, and North Dakota, where spring wheat is extensively cultivated. It is a near relative of the black mustard, commonly occurring with it as a field weed, but may be distinguished by its large pods, which when mature are 1 to 2 inches in length, those of black mustard scarcely exceeding half an inch. Charlock was commonly used as a pot herb in northern Europe centuries ago, but in America it has not, so far as known, been employed for that purpose. Indeed, in some parts of central New York, where it is distinguished from its relative under the name "wild mustard," it is commonly reputed to be poisonous, and is carefully avoided in gathering the young mustard plants. Charlock and black mustard must not be confounded with yellow rocket and its relative, winter cress, the latter of which is described hereafter.

CHICORY (CICHORIUM INTYBUS).

This plant, the ground and roasted root of which is used in small amounts to improve the flavor of coffee and in larger amounts as an adulterant or substitute for it, occurs as a weed in the Atlantic States and on the Pacific Coast, and locally in the interior. Thus far it is confined principally to the vicinity of cities and towns, and has not yet become generally diffused. It is closely related to the cultivated endive (*Cichorium endivia*), a common salad plant. Chicory is a biennial, which in its second year throws up a stiff, branching, almost leafless stem 2 to 4 feet high. In late summer and autumn it bears large numbers of blue flower heads about an inch in diameter and similar in shape to those of a dandelion, which open in the early morning and close after a few hours' exposure to the sun. During the whole of its first year it sends up no stem, but its leaves grow in a rosette upon the ground, closely resembling those of a dandelion, but larger. In the spring of the second year the plant bears a still larger tuft of those leaves, which is soon followed by the flowering stem. The root leaves in their young state are the parts used as a pot herb. They contain a bitter principle and require the same process of cooking as the dandelion.

WINTER CRESS (BARBAREA PRAECOX).

This plant and the yellow rocket (*Barbarea barbarea*) often pass under the general name of mustard, but the two species may be easily distinguished from the true mustards by the form of their leaves, as well as by the technical difference shown in the cross section of the seed. Yellow rocket is a well-established weed in the Eastern States, having been introduced from Europe. It occurs also as a native plant upon the higher mountains from the Atlantic to the Pacific. Winter cress is in common cultivation from the vicinity of New York City southward, and to some extent reseeds. and maintains itself without assistance, but it can hardly be considered under these conditions a real weed. In the city of Washington it is marketed extensively as a winter salad and pot herb. The seed is sowed in late summer after some early crop, or at the time of the last cultivation of an early fall crop, such as cabbage. It is usually sowed broadcast and is given scarcely any cultivation except the pulling of weeds. Yellow rocket itself is rarely used in this country as a pot herb.

DANDELION (TARAXACUM TARAXACUM).

The dandelion is too well-known to require any description. Although, like the yellow rocket, it grows as a native plant on our higher mountains, its occurrence as a weed in lawns and pastures is due, as with most of our other common weeds, to its introduction from Europe. While it occurs in almost all parts of the United States, it is not a common plant in and west of the Great Plains, nor in the extreme south, though it has obtained a strong foothold at a few points on the Pacific Coast. In lawns it is an objectionable weed, not so much on account of its unsightliness as because, from its spreading habit, it chokes out the proper lawn plants. It is not generally known that the market gardeners in the vicinity of Paris have been cultivating the dandelion for the past twenty-five years, and that at least three horticultural varities have been developed within that time. In the United States, however, the dandelion is seldom cultivated, though eaten almost everywhere. The customary use of the dandelion in Paris is as a salad, the plants being eaten either green or blanched. When used as a pot herb the water in which the plants are boiled is changed two or three times during the process in order to remove the bitter taste.

DOCK (RUMEX, OF VARIOUS SPECIES).

Two species of dock, the broad leafed (*Rumex obtusifolius*) and the curled (*R. crispus*), are common weeds in pastures, meadows and cultivated fields, the former extending from New England to the Great Plains, the latter quite across the country. Both are perennials whose root leaves in spring are often used as a pot herb, sometimes alone, sometimes mixed with dandelions or other plants. Patience dock (*R. patientia*) is widely cultivated in Europe as a pot herb, and is grown in America also to some extent for the same purpose, but it seldom appears in our markets. In many places in New England and New York it has escaped from old gardens, where it was often known as "herb patience," and has become established as a weed in meadows. Sorrel dock (*R. acetosa*), or simply sorrel, as it is usually called in England, has appeared in the United States as a weed in only a few places, the plants commonly known here as sorrel being our native *R. hastatulus* of the Middle Mississippi Valley region, and the introduced *R. acetosella* which occurs on poor soils everywhere east of the Great Plains. Neither of these two species appears to be used as a pot herb, and they would probably not be satisfactory for such a purpose. But the true sorrel dock is in common cultivation in Europe, being grown either from seed or by root propagation. This is the most acid of the plants used as pot herbs, nearly all the docks containing, in greater or less amount, an acid principle similar to that of the common pie plant or rhubarb. The fact that the young leaves of one of our native docks *R. berlandieri*, were used as a pot herb by the American aborigines, more particularly the Pimas and Maricopas, is not generally known. The leaves are gathered when the plant is a few inches high and eaten either boiled or raw. They have an acid taste, in this respect resembling the sorrel dock. Growing as it does in the arid region of Arizona, New Mexico and Texas, where succulent vegetation is scarce, it is well worth a trial as a table vegetable.

KALE (BRASSICA OLERACEA ACEPHALA).

Kale, essentially a cabbage plant that does not form a head, is a common market pot herb. It bears several names, including borecole, German greens, Georgia collards, Gallega cabbage, in addition to many descriptive names of varieties. Like cabbage, it requires thorough cooking, and is less easily digestible than many other pot herbs. The young leaves of the turnip (*Brassica rapa*), either green or blanched, are frequently used as a pot herb, particularly in the South. They closely resemble some of the varities of kale in both appearance and taste.

LAMB'S-QUARTERS (CHENOPODIUM ALBUM).

This is a common weed in cultivated fields and gardens, extending almost throughout the United States. It is more commonly known as pigweed, or sometimes as goosefoot, and is to be distinguished from the true pigweed described hereafter not only by technical botanical characteristics but by the fact that the herbage, particularly when young, bears a more or less abundant mealy coating, giving the whole plant a pale bluish-green color. In its young stage, when six or eight inches high, the plant is very tender and succulent, and in Europe, as well as in some parts of our own country, has often been employed as a pot herb. Indeed, its botanical relationship would indicate its adaptability to such a use, since it belongs to the same family as the beet, spinach, orach, and mercury. This is perhaps the most widely diffused and commonest of the weeds which might be used for human food. The plant is an annual, and as a weed is not difficult to keep in check. In cooking, boil for about twenty minutes.

MARSH MARIGOLD (CALTHA PALUSTRIS).

This plant, which in the United States bears more commonly the name "cowslip," is a native of the northern United States and British America, extending from New England to Minnesota and northwestward to Alaska. It grows in cold swamps and wet meadows, shooting up in the spring through the shallow water. Locally it is used among the country people as a pot herb, the plants being gathered when they are in bud or just as the flowers begin to open. By many it is considered superior to any other plant used in this way. From the surroundings in which it grows it is almost sure to be free from dirt or sand, and to this fact, in part, is doubtless due its popularity, for it is very much more easily handled by the cook or housewife than are plants which require repeated washings.

MERCURY (CHENOPODIUM BONUSHENRICUS).

Mercury, more commonly pronounced "markery," is one of the common cultivated pot herbs of Europe, and to some extent has been introduced into our gardens. It shows little tendency to spread as a weed, and is not likely to become generally abundant in the United States. Its value as a pot herb is about the same as the related species, lamb's-quarters. Besides these two species of Chenopodium, or goosefoot, the use of which for food has been taught us by Europeans, we have in our western country several other species, among them *C. fremonti* and *C. leptophyllum*, both of which are native to the United States. There is little doubt that either of these, gathered at the proper season and suitably cooked, would be equally palatable.

BLACK MUSTARD (BRASSICA NIGRA).

This plant, from which the condiment known as mustard is chiefly derived, has long been cultivated in Europe for its young leaves. In our own country it was introduced many years ago as a weed in fields, and in some regions, more particularly in California, where it passes under the general name of "wild mustard," it has become a thorough pest in wheat fields. So easily does it seed itself that it is rarely, if ever, really cultivated in the United States, although small areas in the corners of gardens are often left without cultivation as a "mustard patch." Its value as a honey-producing plant has added further to its desirability on farms. In hoed crops it is not difficult to keep in check.

ORACH (ATRIPLEX HORTENSE).

This is an occasional garden substitute for spinach, though it rarely appears in market. Several varieties are grown in

Europe, which differ principally in color, the stem and leaves varying from the ordinary bright green to a pale yellowish green with white stems or to a dark reddish purple. The plant is a native of Tartary and shows no tendency to become established as a weed.

PIGWEED (AMARANTUS PALMERI).

None of the common pigweeds introduced from tropical America and common in our cultivated fields, such as *A. retroflexus* and *A. chlorostachys*, appear to have come into use as pot herbs, although a variety of *A. gangeticus* is commonly cultivated by the Chinese in California for this purpose. Among our Southwestern Indians, both in Arizona and in northern Mexico, as well as among the Mexicans themselves, a native species, *A. palmeri*, is used largely in a similar manner. In the markets of Guaymas, in the State of Sonora, it is sold in large quantities, the young plants growing each year from seed and being gathered when they are from six to ten inches high. No attempt seems to be made to cultivate the plant, the Mexicans trusting entirely to the natural supply. From the suggestive use of these species of pigweed among the Chinese and the Mexicans, a trial of some of our other species may well be made.

POKEWEED (PHYTOLACCA DECANDRA).

This is a native plant of the United States, growing throughout almost all parts, except the extreme north, as far westward as the Great Plains. It occurs commonly in rich, uncultivated ground, in open places in woods, or in almost any neglected spot. The stems reach a height of from four to eight feet and bear drooping clusters of purple berries. The root is perennial, shaped somewhat like a beet, and in age becomes very large. It contains a deadly poison, which is used medicinally, and in some cases has caused accidental death. The berries, while reputed to be poisonous, are often eaten by birds, and are presumably quite harmless. In early spring the stout stems push out from the ground and are cut when only two to four inches in height. They are thick and succulent like the stems of asparagus, and are not only used by country people, but are commonly brought into the city markets, where they are sold under the name of "sprouts." From the extremely poisonous nature of the root it is evident that care should be taken in using the plant. But the fact that they are always cooked practically removes any danger from this source, as the poisonous principle of the roots is dispelled in the boiling process. The roots, however, are bitter, and if portions remain attached to the stem the taste of the boiled herb is often disagreeable. In Mexico the plant occurs frequently about old missions, suggesting a former use of some kind, but at the present time it does not appear to be employed there as a pot herb. In the United States it is not cultivated, in the proper sense of the word, although those who bring it into the markets are careful to allow it to maintain itself in the areas in which it becomes established. The French, however, always apt in testing and making use of every kind of food, have introduced the plant into cultivation in Europe.

PURSLANE (PORTULACA OLERACEA).

The common garden purslane, more commonly known as "pusley," occurs as a weed in almost every garden in the United States, yet rarely does one meet with a person who has ever eaten it or who knows of its use as a pot herb. The plant is a native of India, has been cultivated from the earliest times, and was such an early accompaniment of civilization as to have a Sanskrit name. It was carried westward to Europe, and has there been in use for centuries as a salad and pot herb. Indeed, several varieties are now known in cultivation. In the United States, however, it is known only as a weed,its principal economic value being supposed to be as a food for hogs, a purpose to which large quantities of it are devoted. Notwithstanding this use, it is treated as a weed, not as a forage plant. As a pot herb, however, it is very palatable, still retaining, when cooked, a slight acid taste. It can be heartily recommended to those who have a liking for this kind of vegetable food.

WINTER PURSLANE (CLAYTONIA PERFOLIATA).

In mountain regions from the Rocky Mountains westward to the Pacific occur several varieties of Claytonia more or less resembling the two well-known species of the eastern United States called "spring beauty." The most widely diffused and representative among the western species is *C. perfoliata*. For many years this has been in use as a pot herb, though a knowledge of its employment for this purpose appears to be confined to restricted localities. The same species, or a closely related one, is reputed to occur in Mexico and in Cuba, and from the latter country it has been introduced into cultivation in Europe. The members of the Death Valley expedition in California in 1891 used large quantities of this plant when they came out of the desert and ascended the mountains to the west, having lived for several months without green vegetables of any kind.

SPINACH (SPINACIA OLERACEA).

The common garden spinach cultivated everywhere in Europe and the United States may be considered the typical pot herb of these two countries. The plant, which was unknown to the Greeks and Romans, is believed to have originated in Persia and to have been carried both westward and eastward, ultimately finding its way to China as well as western Europe and America. It is an annual of quick growth, producing in early summer a large number of triangular root leaves arranged in a rosette. Several varieties of spinach are known in cultivation, as, for example, prickly-seeded spinach, Flanders spinach, and lettuce-leaved spinach. In the southern United States it is grown as a winter vegetable, the seed being sowed in August or September, and mulched with straw or salt hay. Under such conditions it produces a good crop during the late autumn and winter months.

NEW ZEALAND SPINACH (TETRAGONIA EXPANSA).

This plant, which originated in New Zealand, was brought to Europe by Captain Cook in his voyage around the world, and has since been cultivated there to a greater or less extent. It is an annual, with spreading branching stems and inconspicuous green flowers. Unlike spinach, it continues to produce a crop of succulent leaves during the whole summer, and therefore is useful as a pot herb in the hot season, when almost all other plants so employed are not available. It will also withstand a considerable drought, and for this reason is especially useful in regions of limited rainfall. It would probably prove one of the most successful pot herbs for general cultivation in many parts of our western subarid region.

The plants enumerated here do not by any means comprise all the species that might be used as pot herbs, but they have been selected so as to suggest to people in every part of our country certain plants growing in their own region which are available for use in this manner. Doubtless others, particularly among our native plants, such as the common nettle, milkweed, and the round-leafed mallow, commonly known to children as "cheeses," will be found equally important.

Department of Physiological Chemistry.

WITH SPECIAL REFERENCE TO DIETETICS AND NUTRITION IN GENERAL.

Edited by J. HOBART EGBERT, M.D.

EFFECT OF DIET AND DIGESTION UPON THE HAIR AND SKIN.

IF THE coat of a horse is smooth and lustrous we are apt to conclude that his digestive organs are in good condition, that he receives suitable food, and that his intestinal tract is free from irritating parasites. Nor is such reasoning fallacious, for there can be no doubt but that diet and the health of the digestive organs directly influence the condition of the integument and its appendages of both beast and man.

The definite constituents of the hair must be renewed from the bodily fuel through the agency of the blood, and if the diet does not convey these essential ingredients to the blood the structure and health of the hair cannot be maintained. Again, when the general bodily functions are weakened and depressed, the vitality of all parts are weakened, and the hair, depending upon the delicate capillary circulation of the skin for its proper nutrition and strength, failing of due nourishment, loses its lustre, degenerates at the root and falls out. Thus it is that in prolonged sickness the scalp loses its usual health and the hair falls out. Two active agencies are at work: the want of due local nourishment which the limited diet of the invalid occasions, and the effect of failing nutrition and lowered vitality of the scalp in common with the entire body, in virtue of general systemic debility and the predominance of destructive over reconstructive processes in the general tissue metabolism.

Hair contains sulphur, silicon, iron, and manganese. These elementary constituents are not always supplied by a limited diet, and hence the hair may fail of strength and vigor from actual starvation. Those races of men which consume the most meat are notably the most hirsute, but meat alone cannot furnish the necessary nourishment. It is well known in Zoological Gardens that the condition of the hair, feathers, or cuticle of carnivorous mammals, birds and reptiles, is bad unless they are supplied with whole animals—the egesta containing the cuticular appendages of their prey in at least a partly digested state. The strength and characteristic color of the hair of young mammals is not attained as long as milk is their sole food. A dog fed on a limited diet—as crackers and cheese—soon begins to "shed his coat," and later on develops disease of the skin; and an invalid confined to a diet of milk, gruel, etc., may not only sustain a temporary loss of hair, but the general health and vigor of the hair and scalp may be impaired through a want of natural nutrition.

A sluggish capillary circulation is a forerunner of baldness. In order that the capillary circulation may be sufficiently vigorous it is necessary that the functional activity of the liver be maintained, for without a good portal circulation a good capillary circulation is impossible. Barring organic disease of the circulatory system, the man or woman with faulty circulation in the extremities—cold hands, cold feet, etc.—is of bilious habit. Here diet and the condition of the digestive organs may exert a marked influence. Such persons should be extremely simple in their diet and active in their habits. They should avoid all rich and highly seasoned dishes; pies and pastry of all sorts; foods rich in fats; salted, dried, and pickled fish; elaborate *entrèes* and made dishes; cheese, dried fruits and nuts; malt liquors and sweet wines. If alcoholic stimulants are taken at all, the safest form is weak brandy,whiskey and water, or a small allowance of claret, and should be used only as a beverage with meals. The general diet recommended for constipation is usually in order. Cold and tepid baths followed by brisk rubbing of the entire surface of the body will do much to flush the capillaries and maintain a vigorous peripheral circulation. Such measures not only augment the circulation in the scalp and general external integument, but also the circulation in the liver and kidneys and the lining membrane of the stomach and bowels—which also is capillary and, in a physiological sense, peripheral as well.

Sometimes even when the special nutritive supply is maintained and the general bodily functions are regulated, a depressed condition of the vaso-motor system and faulty action of the trophic nerves proceeding from the cervical ganglion to the scalp may exist which prevents due local nutrition and leads to atrophy of the hair-bulbs and extensive alopecia. In such cases a more vigorous diet, with a liberal allowance of meat, is indicated; but the amount of exercise taken should usually be proportionately increased and all means for the preservation of a good general systemic circulation and the regulation of the bodily functions rigorously observed. Progressive baldness traceable to such origin has frequently been benefited by friction and the galvanic current to the shoulders and back of the neck, and by *dry* friction of the scalp with the hands, and with a not too stiff hair brush.

The health and beauty of the general integument—as of the scalp and its appendage, the hair—depend largely upon the capillary circulation and hence are greatly influenced by diet and the condition of the digestive organs. Not a few skin diseases may result directly from improper diet and disorders of digestion. Acne ("pimples"), urticara ("hives"), and eczema ("salt rheum") are prominent examples of this class. Again, certain chronic affections of the skin are perpetuated by erroneous eating and drinking, and it is evident that without due attention to the habits of life, to diet and to hygiene, all measures instituted for their relief are likely to fall short. How many of the children brought to the dispensaries to receive treatment for cutaneous affections come sucking a piece of fat pork, an enormous chunk of candy, or other equally injurious stuff, which at once indicates the impropriety of their food and the lack of regularity in eating. Hence it is that scrofulous manifestations and other "humors" are most common among the children of the more ignorant and careless classes.

Too frequent nursing of an infant at the breast may induce infantile eczema, while the same disorder may arise from errors of diet on the part of the mother, which render the breast-milk unwholesome to the infant. Or, the milk may not be sufficiently nutritious, in which event the diet of the mother should be more substantial, perhaps augmented by cod-liver oil, and more careful attention paid to her habits of life. Even dyspepsia in the mother may lead to cutaneous disorders in the child. With a child "brought up on the bottle" there is equal opportunity to go astray. The food itself may be wrong, it may be given too often and in too large quantity, and disorders of the digestive organs, of the skin and general system may result. It is an error in the diet of these little patients to overload their stomachs with starch and farinaceous products, as arrowroot, rice, farina, etc., as they are prone to undergo fermentative changes in the intestinal tract, inducing diarrhœa, soreness of the integument about the anus, and varieties of eczema. Digestive disturbances and cutaneous disorders are also likely to result in young children from the partaking of coffee, tea and beer which are given them by parents and nurses—an abominable practice. Milk and water are, of course, the proper beverages for their use.

Urticaria, commonly known as "nettlerash," or "hives," may occur from functional derangement of the nervous system, but is usually called forth by the use of some article of food which it is not expedient for the sufferer to use. Thus, the eating of shell-fish frequently occasions an attack in predisposed individuals, as also strawberries, pineapples, and other raw acid fruits. It is usually relieved by a discontinuance of the objectionable article, or articles, of diet, and the use of a saline aperient, in the form of a natural mineral water of alkaline nature.

Acne, which is so common among young persons and which mars the complexion of many an otherwise fair face, frequently depends for its existence upon deranged digestion and erroneous diet. Indiscretions in diet will bring out new pimples at almost any time. Among the articles of diet most likely to provoke acne in those predisposed to it are foods fried in fat—fried eggs, fried oysters, etc.—and buckwheat griddle-cakes, sausages, mince pie, cheese, hot bread, rich cake and nuts. Those who would find relief from this affection should adopt a plain diet, excluding the above-mentioned articles, and also pastry, heating soups, stimulating condiments, coffee, strong tea, beer, ale and wine. Constipation and biliousness must receive dietetic and hygienic relief, and particular attention should be paid to regularity in eating, sleeping, and the benefits to be derived from systematic bathing and abundant exercise in the open air.

Regardless of the *modus operandi*, it cannot well be denied that eating to excess and at irregular intervals, indulging in late suppers, using tobacco immoderately, and drinking beer, ale, and wine, conduce to cutaneous irritation and eruptions, and render relief from existing skin diseases most difficult. Irregularity of living and excesses of all kinds engender these maladies as well as many other difficulties. Many petty indulgences may require correction. It is almost universally known that the complexion is quite certain to be disfigured by the unwarranted indulgence in malt liquors and wines, but intemperance in other forms may lead to similar effect. Not only he who pours out copious libations to the god of festivities may receive the mark of the devotee upon his face, but the intemperate glutton, the immoderate teadrinker, and those who partake too freely of stimulating condiments may likewise paint their noses and bloat their faces.

"Nose, nose, nose, nose,
And who gave thee that jolly red nose?
Sinament and ginger, nutmegs and cloves,
And that gave me my jolly red nose."

COMMUNICABILITY TO MAN OF DISEASES FROM ANIMALS USED AS FOOD.

THE question as to what diseases are communicable to man from diseased animals used as food is at present occupying the attention of physicians and physiologists in this country and on the Continent; and a variety of experiments is being carried out with a view to the solution of the numerous problems involved in this inquiry. A variety of causes has led to the necessity of arriving at a definite conclusion upon the subject with as little delay as is compatible with the difficulty and importance of the investigation—among which may be enumerated the increasing importation of foreign cattle, the extension of the system of sewage irrigation of land, the general acceptation of the germ theory of the causation of epidemics, the certainty of the spead of typhoid and scarlet fevers by an improper milk supply, and an attempt to solve the problem of the relatively small death rate of the Jewish, as compared with the general, population of Great Britain. Papers were read and a discussion held on the subject at the annual meeting of the British Medical Association at Cambridge during this summer, in the section of Public Health, under the presidency of Dr. Acland, the Regius Professor of Medicine in the University of Oxford, and the following resolution was agreed to: "That, in the opinion of this section, the subject of the communicability of disease to man by animals used by him as food urgently demands careful inquiry, both in regard to the actual state of our knowledge thereon and to the legislation which is desirable in connection therewith, and that the Committee of Council of the association be invited to appoint a committee for the purpose of reporting on this matter."

From the care taken to provide the Jewish community with animal food free from communicable disease, the question has especial interest for them, and the following summary may be taken as conveying the present consensus of scientific opinion upon the subject.

No doubt can, of course, arise as to the communicability of the class of diseases in infected cattle known as "parasitic," of which trichinosis may be taken as a type. In these cases the parasite is simply transferred from the flesh of the beast to that of the man, in which it finds a congenial home, and in the process of its development frequently produces fatal results. Trichinosis, until recently unknown in this country, is frequently met with in Germany, owing to the custom there of eating pork, particularly in the form of sausages, more than half raw. Thus in Berlin, where the inspection of meat is obligatory, fifteen outbreaks of the malady were officially reported during the year 1878, and in one of the suburban districts half of those affected died. The immunity of Great Britain from trichinosis is unfortunately a thing of the past, two outbreaks having been recognized during the past decade—one in Wokington in 1871, and a second on board the school-ship Cornwall in 1877, both traceable to the use of pork as food, in one case home-fed, in the second imported from America. The case against meat infected with parasites, of which there are several distinct varieties, is so clearly proved that no object can be gained by discussing it further.

With this exception, the animal diseases which are at present or have been regarded as transmissible to man through ingested meat are seven in number, namely, (1) cattle plague, (2) swine typhoid, (3) pleuropneumonia, (4) foot-and-mouth disease, (5) anthracoid diseases, (6) erysipelas, and (7) tubercle. As regards the first two, the evidence as to their power of specific infection when taken as food is conflicting. The resemblance they both bear to typhoid fever in their symptoms has caused them to be regarded as the analogue in cattle of this malady; but their power of communicating this or any other disease to man is doubtful, and may be considered as still sub judice. The sale of such meat is, however, rightly stopped, because, even if incapable of conveying its specific contagion, it is undoubtedly much deteriorated in quality and its nutritive power much diminished. The evidence against pleuropneumonia is much stronger, as it is a distinctly contagious and febrile disease, tainting the entire body of the animal affected, and warranting its exclusion from the meat market. Yet so inefficient is the working of the legislation upon the subject that Dr. Carpenter, of Croydon, mentions a recent instance of an outbreak of pleuropneumonia in his district, in which it appeared in a farmyard among forty cows, which were all in one shed. The local inspector isolated the first cow, leaving thirty-nine in the shed in which the first case appeared. Of these twenty-two were seized in about six weeks, one after the other, with the disease, and were taken out of the shed, slaughtered, and buried on the premises; but the rest of the herd were killed by the owner and used as food, though they had been kept the whole time in the infected shed. Yet the inspector of the Local Government Board had agreed that all proper steps had been taken in this instance to prevent the spread of the infection. Of course, if these cattle had been examined at the market after being slaughtered, as would have been the case if intended for Jewish food, they would all have been condemned as unfit. Dr. Cameron, the Medical Officer of Health for Dublin, has given it as his opinion, confirmed by large experience and abundant evidence, that bad results ensue from the consumption of this class of meat, yet it continues to be sold at a cheap rate as food to the poor.

Foot-and-mouth disease, the fourth on our list, has been defined as "a contagious, eruptive fever, affecting all warm-blooded animals and attacking man;" and its whole history during the long period in which it has been prevalent on the Continent, and during the last forty years when this country has suffered so much from it, shows that it is indeed a malady of both man and beast. "The communication of the disease to man," says Gamgee, one of the highest authorities, "admits of no doubt;" and Mr. Vacher, the Medical Officer of Health for Birkenhead, in a paper read at the Cambridge meeting, asserts very decidedly that if imperfectly cooked meat from an animal affected with this malady be eaten it undoubtedly places the consumer within reach of infection.

The class of disease of cattle known technically under the name of "anthrax," of which there are several varieties,is certainly communicable to man by ingested flesh. The investigation of this question has been conducted chiefly by German and French physiologists, and they are unanimous as to the facility with which the malady can be conveyed as food and as to its fatal character. Indeed, Mr. Vacher asserts that the tenacity with which the flesh of the affected animal retains the infection is so great that it is impossible to assign a limit to it or to the peril of the consumer.

In respect to erysipelas in cattle, the communication of the disease to man through infected food, though exceedingly probable; is scarcely capable of direct proof, because, firstly, the malady is quite as common in man as it is in animals; and, secondly, it occupies such a peculiar position between specific and simple diseases that when an outbreak occurs it is impossible to say whether it is due to contagion or not. It is, however, so frequently met with, especially in sheep and pigs, that the possibility of its conveying its special infection should never be overlooked, and it should be condemned as utterly unfit for human food, especially as flesh scarcely showing any physical signs of the disease may nevertheless be found actively infective, owing to the insidious manner in which the poison of erysipelas is conveyed.

Lastly, the chief interest of this inquiry centers in the question of the communicability of tuberculosis from animals to man, because not only is this class of maladies the most destructive of all to which human beings are liable (being accountable for at least one-fifth of the entire mortality of the country), but also because, though it was long a matter of doubt whether the disease as it exists in cattle was identical with that of man, this question has now been solved in the affirmative; and the evidence of the communicability of the disease is rapidly gaining strength. It is only comparatively recently that the suspicion of tubercle being conveyed to the consumers of flesh so tainted has been entertained; but its inoculability is no longer a matter of dispute, and it has been repeatedly proved that the malady can be produced by feeding with the flesh or milk of diseased cattle. There is no doubt that thousands of animals in this condition are slaughtered and sold for food, and the only method of prevention recommended by Mr. Fleming is the establishment of public abattoirs throughout the country, the inspection of all carcasses about to be issued from them as food, and the condemnation and destruction of all such as are found affected with this malady. It is indeed highly probable that much of the infantile scrofula and tubercle so prevalent among all classes, and especially the poor, is attributable to the consumption of the flesh and milk of tuberculous cattle.

The prevalence of the disease among bovine animals is known to be very great, though, owing to the absence of sanitary inspection of cow-sheds and slaughter-houses, it cannot be exactly estimated. But it appears to be largely on the increase, and on the Continent it has been ascertained that from one to five per cent. of all cattle are tuberculous. Animals thus affected, do not, as a rule, show signs of wasting, and it is thus only by examination after death that its existence can be detected. I may add that the results arrived at on this subject by English physiologists have been abundantly confirmed by Continental physicians, among whom may be named Gerlach, Chauveaux, Colin, and many others, all of whom have shown that tubercle can be transmitted by the ingestion of the flesh and milk of diseased cattle.

The conclusions to be arrived at from a consideration of the entire subject are that of the specific diseases of animals used as food, the parasitic, anthracoid, erysipelatous, tuberculous, and foot-and-mouth varieties may be deemed directly transmissible to man, that the question of the communicability of cattle plague and swine typoid is as yet undetermined, and that the evidence as to pleuropneumonia, though much stronger, does not so far admit of absolute demonstration. Of course, there is not a shadow of doubt that all such meat is not fit for human food, being deprived of most of its nutritive qualities; but this is a different question from the transmissibility of the identical and specific disease.

I am myself decidedly of the opinion that the care bestowed upon the examination of meat for the use of the Jewish community is an important factor in the longevity of the race which is at present attracting so much attention, and in its comparative immunity, from scrofula and tubercle, to which Dr. Gibbon, the Medical Officer of Health for Holborn, has so markedly alluded in his last report. Naturally such cases do not produce an immediate effect, but their transmission through innumerable generations must eventually bring about a decided result and exercise a considerable influence in building up the mental and physical toughness of the Jewish people, which has been so long an object of wonder; and which, in conjunction with their steadfastness, cohesion, and valor, Goethe considers to be their chief claim before the judgment seat of nations.—Dr. Henry Behrend, in *The Jewish Chronicle.*

SOME NOTES ON ALCOHOL IN THERAPEUTICS.*

By T. D. Crothers, M. D.

Superintendent Walnut Lodge Hospital, etc., etc.
Hartford, Conn.

Some very strange conceptions of alcohol as a medicine exist, and are repeated in really excellent text-books of medicine. Evidently they are the repetitions of assertions of authors which have been accepted without question.

One of these precepts is to increase the amount of spirits if the smaller doses do not seem to have the effect desired.

In a given case one ounce of brandy every four hours is increased to the same amount every two hours. Spirits are said to be indicated and the dose and frequency is the measure of its power.

Recent text-books urge that spirits be given freely in certain cases and prescriptions containing large quantities of spirits are presented as guides. In some cases cautions concerning the dose and its frequency are given, but the fact is assumed that large doses have certain definite effects that can be studied and understood. These counsels are not in accord with the observed facts, and in some cases diametrically opposite. Thus the effects of eight ounces of spirits a day is not double that of four ounces. Where spirits are taken as a beverage the man who drinks a pint of any kind of spirits does not manifest symptoms

---

*Read in the Section on State Medicine, at the Forty-seventh Annual Meeting of the American Medical Association, held at Atlanta, Ga., May 5-8, 1896.—*Journ. of the Am. Med Assn.*

of double the intensity to one who uses half a pint. Observation seems to be conclusive that a point of toleration is reached beyond which there is no appreciable effects from spirits. In a case of diphtheria an ounce of spirits was given every two hours; this was increased to every hour without showing any alteration in the heart's action except a temporary fluttering. The skin seemed to be intensely stimulated and was bathed in perspiration and the kidneys were active, the exhalations from the lungs were increased, collapse and death followed and the physician was sure that the poison of diphtheria had overwhelmed the nervous centers causing death. The spirits taken for two days before the end had not been absorbed but had gone on saturating the tissues and forming ptomaines which were literally poison centers of greater magnitude than the diphtheria germs.

In case of pneumonia the consulting physician urged spirits *ad libitum* as much as could be swallowed, for the reason that if the heart's action could be sustained he would recover. Of course the patient died. A quart of brandy was given daily. The skin, lungs and kidneys made a great effort to eliminate the poison of alcohol, but failed.

The real facts were, the process of inflammation which would have been self-limited, was supplanted by paralysis and the presence of a new source of poisoning of greater magnitude than the primary disease.

Beyond a certain point not clearly recognized alcoholic saturation begins and the effects of spirits after this time is not apparent except in general progressive depression and enfeeblement. At times this point of saturation is manifest in vomiting with excessive stomach and brain irritation. This may go on to what is termed delirium tremens and various manias, marked by cell and nerve exhaustion, with explosions of nerve force.

There can be no doubt of the cumulative action of alcohol in health, even when used in small doses and for long intervals. In disease of any form there are no reasons for believing that this effect is prevented or neutralized. The assumption that the anesthetic action of alcohol in proportion to the size and frequency of the dose or that any action it may have on the organism likewise increases, beyond a certain point, lacks clinical proof. In my opinion alcohol and its ptomaines accumulate in the tissues, and are gradually eliminated beyond the danger point by purely natural processes. This process of elimination has a limit, which varies widely in different persons and is unknown. In disease it is feebler and is reached sooner than in health. The supposed tonic effect of alcohol is no doubt a poison of extreme fatality after a certain period. The point of saturation is reached in which the direct irritant and paralyzing action of alcohol, has reached an extreme limit. Beyond this spirits become a pure chemic poison. The center of new combinations of foreign products, that are not eliminated, but held in abeyance, until some unknown condition expels them, or draws them into the circulation. The clinic experience of the sudden death of persons who are using as a beverage or taking as a medicine large quantities of spirits seem to confirm this view of the sudden absorption of alcoholic products beyond the power of resistance.

A strong man suffering from acute pneumonia had been taking over a pint of brandy daily for eight days. He was given a warm bath and an enema to clear out his bowels. An hour after he died suddenly. In my opinion the bath and enema had roused the absorbent to activity, and the accumulated alcoholic poisons had been absorbed to fatality. Before this the general palsy of the tissues had prevented the absorption of the poisons. Had all the alcohol been withdrawn and the process of eliminating been slowly stimulated this result would have been averted.

In the cases under my care alcoholic paralysis is treated with hot showers and hot air baths accompanied with saline drinks. In most cases this is followed by sharp reaction; a few hours after generally stupor and prolonged semi-partial coma. This I assume to be the absorption of the alcoholic products which have been accumulating in the past. The remedy for which is increased hot showers and hot air baths. This reaction is in some cases sudden delirium and hallucinations or strange morbid impulses. The alcoholic ether odors continue for days after the spirits are withdrawn, which seems additional evidence of this condition. I think the process of gradual reduction of alcohol either in medicine or the treatment of inebriates in direct opposition to experience and rational theory.

On whatever theory spirits may be given as a medicine, to gradually diminish the size of the dose and increase the interval of time of giving it, is without reason or judgment. Whatever special effect of alcohol may be desired, the attempt to reduce this down to a minimum in decreasing doses, is purely fictitious.

In case of typhoid fever where large quantities of spirits had been given and recovery began, great stress was insisted to discontinue the spirits in decreasing doses. Death followed and no intestinal lesion could be found, hence the diagnosis heart failure. In my opinion it was alcoholic poison, with sudden absorption of accumulated products directly due to spirits. Some of the facts I wish to emphasize are first, anesthesia of spirits has a limit, beyond this there is saturation and accumulation of unknown chemic posions, of great fatality. The toleration and fatality of excessive doses of alcohol in both health and disease, point to some unknown conserving force and capacity of elimination of great power. The sudden deaths which follow in these cases are additional evidence. The practical fact confirmed in many ways is that whatever the physiolgic action of spirits may be, its action is limited, and does not increase beyond a certain point, that the effects on the body are cumulative, principally chemic products that are not readily eliminated.

These and other effects from alcohol seem to check elimination beyond a certain point, and become very dangerous. The exhaling of alcoholic ethers from the lungs is significant of saturation and crossing the danger line that should be heeded. In my opinion there is no remedy known of such uncertainty, and physiologic danger as alcohol. The need to-day is a new critical analytic study of the entire subject of alcohol in therapeutics.

DIET FOR SCHOOLBOYS.*

THE QUESTION OF MEALS AND FOOD.

THE question of meals and individual articles of food has many important bearings. If we allow six hours before a full meal leaves the stomach, and two hours for a light one, we find considerable difficulty in arranging the hours so that there may be a continuous supply of nutrient material in the duodenum during the waking hours, and during these only; but in children the process is more rapid, so that four hours should be about the maximum interval. Domestic reasons in this country usually prevent breakfast being earlier than half-past eight, dinner comes at half-past one, and the lighter evening meal about six or seven for most children. Now these intervals are clearly too long.

The agricultural labourer supplements them with three snacks or luncheons—in the early morning, at eleven, and four. Something of the same kind must be attempted for the schoolboy. Even if we take the view that an hour or two of rest is good for the stomach before meals, the schoolboy refuses to carry out our plan, and stops his gnawing appetite by indigestible delicacies. First, then, as to the time before breakfast when there is work to be done. Here there is general agreement that for all but the strongest boys some light refreshment is desirable, if for no other reason than it prevents a large number of colds, and indeed, infectious disorders, since every one is far more liable to these affections when the system

---

**The Hospital.*

is depressed. Milk, cocoa, or a biscuit will suffice, and care must be taken to see that the meal is not evaded by late risers and by those boys who fear the reproach of delicacy. Milk should always be first boiled in hot water from its tendency to be infected with disease germs; cocoa is a mild, safe food, containing a little fat and starch, and preferable to tea and coffee for growing children. Indeed, without accepting the common view of the dangers of tea, neither tea, coffee, alcohol, nor tobacco is desirable for the rapidly growing organism, for they probably hinder metabolism by shielding certain tissues from destruction. French children often have a cup of thin soup at this hour, and the custom might well be adopted here, at least as a change from the round of cocoa and milk. If water is preferred for drinking with biscuits, too much care cannot be taken to ensure its purity. It is, like milk, easily contaminated, and by no means easy to purify when once infected. Like milk, it is safer if boiled, but the taste of boiled water is so unsatisfactory that this plan can hardly be insisted on. The ordinary filters are worse than useless, merely collecting numbers of germs which actually multiply within them, and letting through some of the most dangerous. The breakfast proper should be made a substantial meal, not a mere bread and butter preparation for dinner. Besides plenty of these articles we must add porridge, eggs, fish, bacon, pork, or some such nitrogenous food. Tea or coffee can hardly be avoided, but plenty of milk, butter, and sugar must be given and even insisted on. Cleanliness and good cooking are all essential, and sufficient time for slow eaters and care that the bigger boys do not consume more than their share of the more delicate morsels at all meals is essential. The long interval till one or half-past one, when dinner can be looked for, must be abridged by a cup of milk, a bun, or a piece of bread and cheese towards noon. The main food supply must be given at breakfast and dinner, when the digestion is active and the body untired, so that food may be provided ready for the time of work and digested before sleep. At dinner the chief supply of meat has to be consumed, vegetables eaten, and a full meal taken by every boy in health. If anyone fails in this the cause must be inquired into. Some, of course, are difficult to please on any diet, but most boys, if they can be kept from the pastry shop till after meals, and have a fair variety of well-cooked food, are content.

The food, as Dr. Dukes remarks, may be deficient in quantity, while plenty is provided if the weaker boys are badly served or the meals are too few, since few boys can eat all they need at two or three meals, or if the diet be too monotonous, or if it is bolted in haste. Besides this, the quality of the meat may be bad, the cooking defective, the potatoes and other vegetables served in a state to cause disgust, and the puddings heavy and indigestible. The inability of the Germanic races to cook vegetables in an appetizing form leads to their eating every kind together with their meat, for the sake of the flavor. This leaves less opportunity for bread, of which we seem to consume comparatively little. The defect is to some extent made up by the number and variety of the puddings when these are well cooked. Hence the value of good rice, treacle, and fruit puddings. Another point on which Dr. Dukes has insisted is, that if an economical dietary has to be chosen, and the meat supply kept moderate, cheese and the vegetable albumens from oatmeal, lentils and peas must be increased, though these are less easy of digestion. The evening meal need not include nitrogenous food, but may be made a substantial one if we give plenty of sugar in the form of jam, marmalade, and treacle, as well as butter and milk. If this is taken not later than six o'clock, the weaker boys will be better for milk or a bun before bed-time, but anything like a supper should be carefully avoided.

Variety does not imply a constant supply of a number of different articles together.

Indeed, the more delicate digestions succeed best on meals of one or two kinds of foodstuff, provided these are changed from day to day. Change of the menu from day to day and, in fact, from week to week, is of the greatest importance. Little has been said about alcohol; because young and healthy persons, properly fed with appetising food, are better without it. Still, there is some truth in Savory's remark, that a little beer served at dinner, while modern customs exist, prevents boys seeking it surreptitiously, since they generally want what is not allowed. Every effort is required to afford a wholesome and palatable diet, to satisfy every healthy craving of the stomach, and to ensure that the food chosen is furnished at suitable times and in such a way that every boy has ample leisure to consume it.

ALCOHOLIC STIMULATION.*

By Sir Benjamin W. Richardson, M.D., F.R.S.

It has been my duty to dwell in these columns on the subject of alcohol as a remedy in disease, and I have tried to show that it can be dispensed with as a remedy in the most satisfactory manner, so that we can do very well without it. I have never, however, striven to show that alcohol is without its effects, and the subject before the profession is not simply alcohol as a remedy, but stimulation as a mode of cure; a subject that more than ever is being practically discussed.

In the days of the noted Dr. John Browne, there was quite a fierce controversy upon alcohol. The Edinburgh School, with no less an authority than Cullen at its head, was averse to stimulation, and amongst the stimulants employed alcohol largely lost its hold. Browne made his appearance, and finding stimulation one of his methods of treatment, fell back upon alcohol, and got himself into trouble socially as well as medically. The Brunonian system was one of stimulation, and was so strong for the moment that it had its disciples and advocates. It set its author at variance with his brethern; he, in its defense, was obliged to administer his great remedy on—what may be considered as—" the sly," and got into scrapes from which he was, with difficulty, extricated. He made his theory, but he did not make a sound reputation with it. He certainly declared that alcohol was an antiseptic, and to that extent did good service, but he did not prove its practical value on the list of remedies. A patient suffered from fever, and Browne surreptitiously gave him, or had given to him, abundance of alcohol. Under the treatment the patient sank and died; a post-mortem was carried out, and the tissues of the body, dead as they were, seemed fresh to the eye and inodorous. Browne noticed their life-like character, and called attention to the circumstance that his treatment preserved the parts as if they were alive, a statement well deserving of notice and comment, as worthy of observation as are the evidences of a museum where the specimens are retained in spirit, in a state of preservation.

The treatment of living matter and living function under alcohol is entirely different from the treatment of dead matter by it, and here lies the point that, as doctors, we have to decide upon and base our instructions. We can safely use alcohol as a preservative of dead substance, but can we use it or anything of the same class as safely as a stimulant on living material? In one instance we are recognizing its true qualities; in the other we are using it for the sake of its vital action, and we cannot logically do both. Preservation, in so far as it means preservation merely, is freedom from decomposition, not from death. Life is active continued decomposition, but with reconstruction. If I touch an animal body with a thing that arrests action I touch its life and it must succumb; must become dead-drunk or dead-dead.

The more the profession, ignoring prejudice and old practices, think of stim-

---

The Hospital.

ulation as a mode of cure and argue it out, the better for the world. What is known as practice has proved nothing whatever in the matter. We have seen people dead-drunk recover consciousness, and we have seen sick people recover from their illnesses under alcohol, so that we have learned to look at the occurrence as natural, or even as more than natural, according to the law of necessity. But when we think over it we have seen persons, by the score, who have been well and hearty, though they have never been dead-drunk; and we have seen persons who have recovered from their sickness, although they never imbibed a drop of stimulant, and the fact that they get well under such circumstances is sufficient evidence that the stimulant has not been required. Men who are given to prescribe alcohol actually talk as if all persons under their care got well from the treatment which, indeed, would be the case if they were right, whereas, under the alcoholic "sheet anchor," the sick die in spite of it, and sometimes in sheer consequence of it.

Alcohol, in the end, does not stimulate, it really depresses if it does anything at all. We must admit it does something, and he is a mere fanatic who questions its effects. There can be no doubt that for a short time it whips on the circulation. It quickens the heart-beat; it increases the circulation of the blood; it excites the brain; it preserves the tissues from decomposition; but is it thereby of service? What it does seems to the profession, and feels to the sick, to be stimulation, and upon this all its assumed virtues rest. It appears to give new life; it raises the weak for a short time, even if it quickens death. It acts like running or drinking, or becoming mentally excited, and although no one would use these acts as remedies for disease, they might appear to have their advantages.

I do not agree with those who are astounded, and express their astonishment, when they see doctors giving wine or recommending spirits, wine, or beer to persons under their care. Life is a very slender thread; the doctor's art is very limited; the doctor is called to do; the people follow the doing, and constantly they feel stimulation render them service temporarily. If the doctor told them the truth, namely, that wine is the most detestable of mockers, they would not believe him, and so he is daily and hourly tempted to evoke phenomena which, from the beginning to the end, are a deceit; which shorten instead of prolong existence, and which may kill instead of cure. It is true, nevertheless, that every doctor should think for himself concerning the phenomena, and should prefer to rest on the permanent physiological, rather than on the empirical modes that lie at his disposal.

◆

THE TOMATO SLANDERED.*

A FRIEND sends us a clipping from a local journal headed "Have you tomato heart?" and asks "how much truth is there in this?" The article in question is accredited by the journal to the Pittsburgh (Pa.) *Leader*, and accuses the tomato of producing on the human system effects similar to those produced by other members of the natural order *Solanaceœ*, to which it belongs, and according to the *Leader*, "whence came our most dangerous vegetable poisons, including *opium* belladonna, stramonium, etc." Among the evils of which the fruit is accused of producing is the "tomato heart," the symptoms of which are, however, not given in the extract sent us.

The article in question is merely a bit of newspaper sensationalism, the value of which, from a scientific standpoint, can be measured by the statement that opium (natural order *Papaveraceœ*) belongs to the solanum tribe. The mere fact that tomato is one of the *solanaceœ* should, however, militate against its usefulness and healthfulness no more than it does against the potato, which is also a member of that family. Indeed, of the two plants the tomato is the more harmless, for while solanine has been obtained from the potato, it has not yet (to our knowledge) been separated from the tomato. It does not exist in the juice of the fruit, though it is probable that it may be found in minute quantities in the seed, since an alcoholic extract of the latter has a bitter taste.

---

* *National Druggist.*

Like the statement which went the rounds of the secular press a few years ago, accusing the tomato of causing cancer, the allegations of the *Leader* are scarcely worth notice, except as they are liable to produce on the impressionable and uninformed uneasiness or prejudice against a fruit which the experience of several generations has shown to be not only an agreeable and valuable food-stuff, but one the use of which from the standpoint of hygiene should be encouraged instead of condemned. The U. S. Dispensatory (under the heading of Dulcamara, *solanum dulcamara*, page 480) speaks of the tomato as "so much used as a vegetable, and so advantageous through its nutritive, laxative, and antiscorbutic properties."

No more accurate are the statements of the *Leader* in regard to the history of the plant. "It originally belonged," according to this authority, "to South America, and was brought to this country in the sixteenth century as an ornamental natural curiosity, and on account of its beauty it was afterward carried to Europe." The word *tomatl*, from which our word tomato is derived, is ancient Mexican or Aztec, and the first account of the fruit came from Mexico, where it was found in common use by the Conquistadores. Johannes Nieremberger, Professor of Physiology at the Royal Academy of Madrid, who was first to describe in scientific terms pretty much all of the new and strange fruits, vegetables, birds and animals of the New World, in his Historia Naturæ (compiled in the early part of the seventeenth century and published at Amsterdam, in-quarto, 1630) gives a detailed account of the uses to which the *tomatl* was put by the Mexicans. By the latter it was eaten with almost everything. "Ground up into a paste with chilli (red pepper)," says Nieremberger, "tomatl is added to almost every kind of dish and all kinds of meats, stimulating the dullest appetite."

One can not but wonder who it was in this country, in the sixteenth century, with sufficient æsthetic taste to bring into it anything merely as an "ornamental natural curiosity." "Just before our civil war began," says the *Leader*, "it (the tomato) came to be used as an edible fruit. No other country up to the present employs it as a food." Either the writer of this nonsense is grossly ignorant, or for purposes which we can not even surmise, purposely misrepresented facts. As we have shown, the tomato was the commonest article of diet among the Mexicans at the time of the conquest, and it has never ceased to be so up to the present day. The memory of the writer goes back nearly fifty years, and a half century ago the fruit was as common in the south as it is to-day.

Prior to 1860, while the tomato was known in European countries, it was not a common article of food, but at present it can be found on the bills of fare of every restaurant and hotel, both in Great Britain and on the Continent, and its use is constantly spreading.

Besides being used by the Mexicans as a food, the tomato was regarded as a most valuable medicine in many disorders. The leaves and fruit are used as a cooling cataplasm in erysipelas. "They cure," says Nieremberger, "sinuses and abscesses, and are excellent for headaches. They are useful in constipation and sour stomach, and when mashed up with salt and applied to the part, abort the mumps. The juice is valuable in affections of the throat, and as an application to serpiginous ulcers." And so the old professor goes on, enumerating diseases and conditions in which the tomatl was used by the Mexicans, the list including all kinds of eye diseases, earache, skin trouble, etc., too numerous to mention.

THE DANGER OF ARTIFICIAL EMACIATION.

Some people are born to be fat, just as others are born to be great, and it is not always desirable or even safe to fly in the face of Providence by seeking to diminish a single cubit of one's sectional dimensions. The principle to bear in mind is that everyone has his normal weight, though circumstances may determine a more or less temporary increase or diminution thereof. A departure from the normal in either direction is incompatible with perfect health. This of course, leaves in suspense the question as to what is one's normal weight, and those who are afflicted with what appears to the dispassionate observer to be a superfluity of adipose tissue usually resent the imputation that their obesity is other than an accidental and unavoidable circumstance. This point is easily settled by trying the effects of a carefully regulated but not over-strict regimen associated with daily exercise in the open air. All really superfluous tissue will disappear, although actual weight may not be palpably diminished, firm muscle taking the place of useless and burdensome fat. Obesity, however, is essentially a condition to be dealt with on an exclusively physiological basis. It is, of course, more or less amenable to medication, but the influence of drugs involves a brutal disturbance of the processes of nutrition, which cannot but be prejudicial to health. This is particularly the case in respect of the employment of thyroid gland in extract, which, in effectual doses, often entails symptoms of a very disquieting and even serious nature. A sufficient number of cases have already been recorded to justify a note of warning, and it cannot be too strongly impressed upon practitioners that the thyroid treatment of obesity is one attended by a tangible amount of risk. In a German contemporary the case is recorded of a certain well-known dramatic artist, who sought to combat the opulence of form with which Nature had endowed him, and died in consequence. On ceasing to be obese—for the treatment was so far successful—he lost the placid temperament which previously characterised him, and became the prey of an unhappy irritability, consequent on an acute sensation of *malaise*; in short, he became nervous, impressionable, and as unrecognisable from a moral as from a physical point of view. This story has a moral: Nature creates the fat and the lean, and wisdom lies in a voluntary adaptation to altered circumstances. For a fat man to "fly in the face of Providence" is a fact which ought to be discouraged, the more so as evidence is still wanting of the æsthetic superiority of the thin over the fat.—*Med. Press.*

◆

TUBERCULOSIS INFECTION FROM FOOD.*

By Charles E. Winslow, M. D.
Los Angeles, Cal.

Preventive medicine to-day, like a gigantic signal light, sends its piercing rays into all the world, guiding medical men upward to a plain above their forefathers which gives advantages unknown before. Old theories have developed into facts, prophecies of the past are now being fulfilled, and hygiene has been clothed in new garments of interest. There is more earnest thought along this line than ever before. We have the benefit of the most advanced laboratory investigations, giving us an understanding of the causes of disease hitherto unknown. With this growing enlightenment comes a greater responsibility and a more urgent need of earnest labor in preventive medicine. Science, as she turns the pages of this new book of knowledge, calls for pure food, pure drink, pure air and better protection from disease and death.

Man seems prone to disease, and of all the ills he is heir to, the most appalling in its dire results is tuberculosis. Like a

---

*Read in the Section on State Medicine, at the Forty-seventh Annual Meeting of the American Medical Association, at Atlanta, Ga., May 5-8, 1896.—*Journal of the American Medical Association.*

great octopus it reaches out its tentacles after the human race, blighting all who come within its grasp, sapping the very life blood, making a wreck of noble manhood and bringing misery and despair to its victims. Having a death rate in the United States of over one hundred and seventy-five thousand a year, with one-seventh of all deaths in the world from this dread disease (Harsch), leaving in its wake seeds that will bring care, sorrow and death to thousands more, it becomes a hideous menace to humanity.

There is an increasing anxiety among the thinking medical profession due to the resistance of this disease to the advanced curative remedies, for at present all have come far short in checking the progress of this most formidable of all diseases. Although in respect to curative medicine we are still groping in darkness, the light of progress has illuminated the path of preventive medicine, showing that the enemy must be met and vanquished under its banner.

Comparatively a few years ago a majority of the medical men did not believe in the communicable nature of tuberculosis, but scientific research has proved it beyond a doubt, and the cloud of heredity that has hovered as a pronounced doom over hundreds of lives, shutting out every ray of hope, has been dispelled. Many with the predisposition to consumption have accepted this bow of promise, and by changing conditions have conquered the inherited tendency to the disease, becoming healthy and useful men and women.

That the colonization of Koch's bacilli in the animal tissue causes the disease, is the belief of the most advanced investigators. If this be true, besides proving that the disease is infectious, it gives grounds upon which we can work out our own salvation by controlling the spread of the disease. The two great mediums through which it reaches the human system are air and food. While the inhalation of bacilli-laden air affects the lungs more largely, tubercular food usually causes the infection through the bowels. The food of a people is its strength; a poorly-fed will be a demoralized people. The more wholesome the diet the stronger is the nation. Among the food products none take the place of milk. There are produced in the United States nearly five and a half billion gallons of milk, more than one billion pounds of butter, and nearly nineteen millions pounds of cheese. How important that an article which forms such a large proportion of the food of the people of this country should be pure and wholesome. Tuberculosis is disseminated more largely through its agency than that of any other food.

The most common disease of the cow is tuberculosis. The close relation that exists between the cow and the human family render it possible for the spread of this frightful disease, and for man's best friend to become his worst enemy. Some writers have claimed that the only nations in the world free from tuberculosis are those that have not domesticated the cow, and that this disease is perpetuated by the domestic cattle That this is no imaginary danger, but real and menacing has been repeatedly proved by experiment and research.

Human beings and the lower animals, living upon the milk from tuberculous cows, have contracted the disease. In one experiment seven out of twelve calves, and two out of five guinea pigs, fed with diseased cow's milk, developed tuberculosis, while the milk from seven cows infected seventeen animals out of eighty-seven inoculated. Obermuller found that out of forty guinea pigs, into which milk bought from dealers was injected, three became affected and died. In his experiments, using centrifugalized milk mixed with the cream of the same milk, ten out of sixty guinea pigs were infected. Roth and Broferro infected guinea pigs from butter made from the milk of tuberculous cows. In 55 per cent. of the experiments the milk from cows having tuberculosis has conveyed the disease to the lower animals. (Ballinger.)

Numerous cases have been reported before the societies where physicians have directly traced the disease from cow to the human being. It exists to an alarming extent in our large dairies. Very little milk reaches our cities free from mixture with milk from tuberculous animals. (Bush.)

From 5 to 10 per cent. of the slaughtered animals have tuberculosis. The cooking of the meat used for food lessens the danger of infection from that source. The bacilli introduced into the system may migrate to different parts of the body, forming here and there little colonies, the lungs being most often the seat of the attack, the digestive tract next. The infection of the intestinal tract by tuberculosis is more common among children than adults. The increasing cases of tuberculous joints, meningitis and infected bowels and glands in childhood can be largely accounted for by the use of diseased milk.

The majority of people are not predisposed to tuberculosis; the immature child and the invalid are most susceptible to the disease. The bacilli rarely find a home in a healthy human organism. Anything that depletes the system leaves it in a condition to become infected; therefore, an impure diet of any kind tends toward tuberculosis, while good, wholesome food will aid in throwing off the disease. The food of a human being may be full of the bacilli and still the system be so nourished that it will not retain the germs. While this may be true, still if the bacilli can not gain entrance into the organism there will be no danger of infection.

Tuberculosis is not so contagious as many diseases, but it holds its victims more firmly in its grasp than almost any other enemy of mankind. And yet this curse of the human race can be prevented. To accomplish this there must be strict sanitation. More and more attention is being given to the subject, not only by the physicians but by the people at large. To-day the hygiene of our cities is one of the great questions with which municipalities have to deal. The sale of food that is infected with disease should be restricted and the punishment made so severe that the dealer will fear to sell such food. Each community should have an inspector, whose duty shall be to carefully examine all food sold. Some of our cities have greatly improved the quality of their milk supply by so doing. Sterilizing milk lessens the danger.

Milk containing tubercle bacilli is a diseased product. Wherever there is this microörganism there is tuberculosis. No tuberculous animal can give pure milk, the disease must affect all the organs of the body. Every cow, private or dairy, should be examined for tuberculosis and other diseases by an expert, and the milk of every new cow entering a herd tested before a drop of it is used. The inspection should be periodical, and carefully and systematically made. There should be a physical examination and the tuberculin test should be used, for it has been proved that milk from cows, which give no physical signs, is often infectious. Although Koch's tuberculin has not been a success as a therapeutic agent,it has proved a useful aid in the diagnosis of tuberculosis, and no herd can be thoroughly inspected without its use. The healthy cows should be marked and all tuberculous animals, no matter how slightfully affected, destroyed. It is a serious matter to go into a man's herd and kill his cattle, but it is pernicious to let such animals live, a menace to a community.

Not only should the cow be inspected but its treatment and surroundings. The animal from which milk is taken should have the best of care, be fed wholesome food and have stables and surroundings neat and comfortable. The utensils used for holding milk, making butter and cheese should be clean and free from dust. No person suffering with tuberculosis should be employed about a dairy, creamery or where food is prepared or sold.

Only milk and its products from inspected dairies should be placed on the market. There should be abattoirs where the slaughtered animals could be examined by competent experts, and no market should be allowed to sell meat which does not have the inspector's tag.

All articles of diet should be kept from contaminating dust. Even the wrapping paper may infect healthy food. Eating utensils used by consumptives should be disinfected.

Inspection is a necessity. To make it a success the inspectors should be educated men and their decisions enforced by law.

The cost of sickness is great, so immense that we fail to grasp its magnitude, nor can we form a proper conception of the annual financial loss to the nation from this king of terrors. Every life has a financial value, every life saved is so much gained for the community. The child who dies before he is able to be a wage earner, is a loss of just so much as has been expended on him and what he could have earned had he lived. When a man dies of this disease it is not alone the expense of his sickness and the value of his wages that are lost to the world, but the time of those who cared for him, and the expense of the expanding influence of the disease he has left behind him.

With the wonderful development of our country comes increasing danger of infection from the foreign element which,absorbed by our people, by its lack of ordinary sanitary precautions aid in spreading disease. There is a demand for better means of protection.

Every charitable institution in this land is an unconscious recognition by the people of the importance of sanitation and teaches that man should not live for himself alone but for humanity. It is our duty as physicians to devise means for the amelioration of the human race.

Progress in preventive medicine has given us facts that prove the danger and has shown us a logical means of prevention. With this light to aid us we must impress the truth upon our fellow men.

The people are thinking about these things and are increasing in knowledge; public opinion in all its unmeasured power is slowly progressing.

Education and a wise use of education will do much, but an educated people can not do all. There must be a willing government to enforce. The growth of sanitary science calls for advancement in controlling sanitation. State and local authorities can not shirk the responsibility; they are bound to protect life from the danger of death by disease, as from rapine and murder, no matter how great the expense. For a municipality to pay no attention to the sanitary condition of the community is to become the abettor of crime. Some of the States have taken up the subject and their health officers have done noble work in checking the advance of disease, but in order to do the greatest good to the greatest number there must be more legislation in favor of sanitation. There must be intelligent men at the outposts, guarding hamlet and city, a united action along the line, with a master mind at Washington advising and controlling the entire force.

When advancing civilization shall recognize justice to humanity and give place among our presidential advisers to a man of science who will guard the common safety and welfare of our nation, lessening sickness and want, sorrow and suffering, wasting and death, then may we hope to see science triumph over disease.

Department of Hygiene.

WITH SPECIAL REFERENCE TO STATE AND PREVENTIVE MEDICINE.

Edited by HENRY LEFFMANN, M.D.

THE EFFECTS OF DISTILLERY PRODUCTS UPON THE WHOLESOMENESS OF MILK.

MUCH has been written concerning the wholesomeness of milk derived from cows fed upon residues from distilleries. The use of brewers' grain, which are the undissolved portions of the malt used in making the mash, has been severely condemned by some authorities and approved by others. It seems that much depends on the condition in which the grains are fed. If in a fermenting state, which they quickly assume, they are not wholesome, but if fresh they are satisfactory, at least, when employed in limited amount. There is scarcely any food ration which used exclusively or in large proportion will not give trouble. A report has been recently issued by the Pennsylvania State Experiment Station, which gives some interesting data concerning brewers' grains and we quote a considerable portion of the pamphlet.

"The Station has lately received two samples of dried brewers' grains, a feed which is attracting considerable attention since the processes for drying have been so improved as to be practicable and economical.

The results of the analysis are given with the average of eight analyses made at the New Jersey Experiment Station and representing the product of four different companies:

	1	2	Average of New Jersey analyses.
Water	7.36	7.84	9.50
Ash	5.62	2.73	3.83
Protein	23.69	24.81	21.53
Crude fiber	13,91	13.50	13.82
Nitrogen-free Extr't	43.68	44.52	45.01
Fat	5.74	6.60	6.31
	100.00	100.00	100.00

It will be seen that there is substantial agreement between the composition of the samples and with the New Jersey average.

In the manufacture of beer, it is the effort of the brewer to convert the starch contained in the barley or other grain used, first into sugar and then into alcohol, without removing any other material from the grain. As a consequence, the resulting grains contain larger percentages of every other ingredient, notably of protein. As regards their percentage of the latter ingredient the dried grains are quite similar to peas, but on the other hand, they contain nearly three times as much woody fibre as peas and correspondingly less starchy matter. In appearance and physical properties they resemble oats or barley, but are richer in protein and can be judiciously used to balance up a ration deficient in this ingredient and are therefore of special value for milk production and probably for growth. At $14. per ton, the price reported they would constitute a relatively cheap grain feed.

The value of wet brewers' grains for milch cows has been almost universally recognized, the chief objection to their use being the readiness with which they ferment and decay and the danger of thus introducing undesirable ferments into the milk. These objectionable features are of course absent from the dried grains, while direct experiments, also made at the New Jersey Station, have shown that they are practically just as valuable for milk as are the wet grains."

Upon the question of the effect of feeding cattle with the so-called distillery-swill, or still-slop, that is the residue left after distillation of the alcohol from the fermented mash, there is also much difference of opinion, and comparatively little positive experimental information. The question has lately been studied in some detail, by Felix Beck, as far as regards the residues left from the manufacture of potato-spirit. His conclusions, submitted as a thesis for the doctor's degree at the University of Leipzig, have been published in pamphlet form, and we are indebted to Dr. P. Vieth, director of the Dairy Institute at Hameln, Germany, for a copy. Beck finds that the daily feeding of the still-slop in the proportion of forty-five pounds to each thousand pound of body weight produces a slight increase of yield of milk but no significant alteration of the proportion of fat, but that when the proportion fed is much increased a distinct increase of quantity of milk usually occurs and invariably, a diminution of both the fat and total solids. No noticeable change in the proportion of ash of the milk was produced by the liberal feeding with the material, nor did it appear that the ratio of the ingredients in the ash was directly affected. The odor and taste of the milk were not affected.

Beck states, however, that experience shows that milk from cattle which receive liberal allowances of potato still-slop is not suitable for the feeding of infants, but was not able to trace definitely the cause. The presence of bacteria will not account for it, and it is probably due to some substances contained in the potato, or produced during the fermentation, which enters the blood of the cow and is secreted by the milk-gland. It appears, also, that the excretions of a cow fed with this material are irritating and a disease of the foot is caused by them. When the swill is fed in a fermented condition, its action is still more objectionable. Beck, however, calls special attention to the fact that the use of the material in moderate amount affects milk intended for nursing infants only; older children and adults may use it without danger.

MUNICIPAL LIABILITY FOR SANITARY DEFECTS.

This is an age of suits for damages. The trial lists of our courts are choked with cases against corporations which carry on work that imperils life and limb. The street-railway companies are especially liable to such suits. Shrewd lawyers are permanently employed for the business of settling claims for injury to person or property, for it is well-known that heavy damages will almost certainly be rendered if the case goes to a jury.

Cities are corporations and suits are often brought for damage done to person or property, but such claims usually rest upon some tangible or specific defect or action. Lately a new phase of lawsuit has arisen. From an able and extensive report by Messrs. J. W. Hill, Samuel Whinery and Geo. H. Benzenberg, on the improvement of the Cincinnati water supply, we take the notes of two interesting cases.

A suit has recently been brought against the Ashland (Wis.) water-company by Mrs. Julia L. Greene of that city, for the legal value of the life of her husband, who died of typhoid fever in 1894. The suit is based on the theory that the water supplied by the water-company was polluted by sewage and infected by the typhoid bacillus: that this contamination was pointed out by the board of health and that in spite of this warning the company refused or failed to adopt any means of purification and continued to supply the infected water to its customers, and that from this source Mr. Greene imbibed the germ of typhoid fever and that the company by its negligence is liable for this death.

A citizen of Duluth (Minn.) has brought suit against the water company of that city for the loss of his son's life by typhoid fever, alleging that it was contracted from the sewage polluted water.

If either of these suits should be successful a precedent will be established which will bankrupt many water-companies and municipalities in the United States. Suppose, for instance, the City of Philadelphia should be held in pecuniary liability for each of the 469 deaths that were caused by typhoid fever in 1895.

In the two instances cited, suits are brought against water-companies which are private corporations. There are certain legal restrictions as to the liability of municipal corporations which may avoid similar suits, but even the litigation necessary to test the law will be costly and threatening.

To begin a suit is very easy; to get a verdict is a far different matter. Theoretically, the law is without money and without price, but practically it is costly and devious. To establish that a given case of typhoid fever has come from a certain source is no easy task. Most sanitarians are in complete agreement as to the usual manner of propagation of this disease, and it will doubtless not be difficult to get expert testimony in favor of the allegations of the plaintiffs in the suits above noted. In trials, however, a definite relation between the injury and the alleged cause of injury must be established, or as the lawyer's phrase it, the *corpus delicti*—the body of the offense—must be shown. In these cases, the body of the offense is the typhoid bacillus, and the attempts to find this in water known to be polluted have mostly failed. It is true there are numerous published statements of the finding of this microbe in water, but when they are closely scrutinized most of them are found to rest on insufficient data. Moreover, how will it be possible to determine the character of the water at the time of the infection? Infected water does not act like a common poison; with such, the symptoms arise almost immediately, but with typhoid fever there is a long incubation period and several weeks of illness. A death from typhoid fever on October 30 may have resulted from an infection on October 1st, and how will it be possible to secure a sample of water representing the earlier date. Indeed, it seems to us that it would be necessary to show that the disease germ was actually in the portion of water which had been consumed by the patient. The case is again quite different from the finding of a poison. If a person who has been poisoned is known to have taken of soup and a small amount of this remains in the plate, an analysis which shows the presence of a poison capable of causing the symptoms noted, makes a very strong link in the proof,for the presumption is that it was equally distributed through the mass, but the typhoid bacillus is an individual, and it may be in one portion of a mass of water and not in another.

It will not be to the advantage of sanitary science if such suits become frequent. The theories in regard to the cause and propagation of disease are pretty well established, but they are not ready to be submitted to such severe tests. Few, if any, sanitarians at the present day will doubt that if a city using an unfiltered surface water has an annual typhoid death-rate of thirty per hundred thousand, the fault is largely in the water, but to maintain that any particular death is due to this cause goes beyond good judgment. In any large community there are local causes of disease. Various forms of food, especially milk and green vegetables, may distribute the disease; in some cases direct contagion may be responsible.

If these cases ever reach the stage of trial the conflict of expert testimony will be interesting, if not startling, and we will get some idea of the drift of thought among doctors and chemists and have an opportunity of estimating how far doctrines taught by the leaders in sanitary science have been accepted by the educated classes.

THE HYGIENE OF WATER SUPPLY.*

By Alfred Schofield, M. D.

Water, when pure, is not a dubious mixture, like air, of gases in various proportions, but is, as we know, a definite chemical product, formed by the union of two volumes of hydrogen with one of oxygen, the three volumes condensing into two as the gases change to a liquid. We say "when pure," for seldom indeed is this interesting fluid composed of these two gases alone. We hear a good deal about the "adulteration of food" act; but all the adulterations of food put together, or of other beverages, are not to be compared in importance with the adulteration of water. We will prove our words further on.

---

* Abstract of article in the *Eclectic Magazine*, taken from *Leisure Hour*.

Meanwhile, consider what a tricky sort of fluid this innocent compound is. In the first place, it is protean in form; it can be in turns a solid, a liquid, and a gas. But that is not all. Fluids, as a rule, expand with heat; water, however, at 32°, when heated, begins to contract in volume until 39° are reached, from which point it expands. Water just about to freeze at 32° is therefore lighter than the water 7° warmer, and hence rises to the top—one result being that ice forms on our ponds first at the top, and not at the bottom. Another painful eccentricity of water when it freezes is that, instead of contracting still more in its change from liquid to solid, it has the truly exasperating quality of expanding one-eleventh of its bulk, bringing destruction and ruin thereby into all our houses by burst pipes and boilers.

If we take water at its other extreme—that of heat—its behavior becomes positively weird. In its change from gas to water three volumes were reduced to two; in its transformation from water to vapor two volumes do not become three, as we should naturally expect, but over three thousand! It is true that while the one volume of water is incompressible, these three thousand are elastic; but this is only what we should expect. It is this mighty increase in bulk and elasticity that makes steam the mechanical power of the universe.

Steam, again, contains an immense amount of what is called latent heat, as it requires nearly one thousand times as much heat to raise boiling water into steam as to raise water from 211 to 212°. We merely mention this in passing, as we do many other facts, by way of remembrance, and not to reduce these pages to the level of a class-book. We emphasize this point of the latent heat of steam, however, to bring intelligent opinion to bear upon the immense superiority of steam as a disinfectant compared with hot air. Air at 213° is 213° and nothing more, and very soon gets below this; but steam at 213° has a reserve force of latent heat in the background that renders it immensely more efficacious in destroying spores, penetrating as it does into the folds of the infected articles, and gradually parting with its latent heat.

The sources whence we obtain water are mainly five in number—one from above (the rain), two from beneath (wells and springs), and two on the earth's surface (upland waters, such as lakes and reservoirs and rivers).

It is generally supposed that rain water, at any rate before it reaches the earth, is absolutely pure. Such, however, is not the case. In the first place, in England all the rain water contains on an average about two grains of salt per gallon. Then it always washes the air through which it passes, and hence, before it reaches the earth, is laden with spores and germs, and dust and particles of all sorts. Even if it were pure, it is sadly deficient in quantity; for the rainfall in England would not supply above fifty people per acre, although nearly 3,700 tons of rain per annum fall on every acre. Rain water is not very palatable. If used for drinking, it should be stored in stone or slate cisterns underground, as at Gibraltar.

With regard to the surface waters, no river in England is long enough to purify itself from the sewage that falls into it. Naturally, river water is extremely pure, and is much less hard than spring water, and would form a good drinking water but for the reason given above. Nevertheless, London, as the largest city in the world dependent upon river water, draws up daily nearly one-third of the whole river Thames. Of course such water cannot be used directly, but requires the most careful filtration. The water is allowed, first of all, a week to settle in reservoirs, to give the coarser sediment time to settle, and it is then run off on to the filter-beds, which are several feet thick, and constructed of very fine sand upon the surface, with coarser sand and gravel below. The real filtering agent is the inch of fine sand, and until lately, whenever this had been used a short time, it was removed and well washed.

A most extraordinary revolution in filtration has, however, been brought about by our recent discoveries of the purifying and antiseptic powers of microbes. We knew they are the scavengers of the earth, but were slow to understand that they might with ease be pressed into our service and compelled to do our dirty work to order. A layer of mud containing millions of germs to the cubic foot is spread over the surface of the sand, and so far from being cleansed from impurities, it is never changed as long as the water will pass through. The result is wonderful. A jelly-like mass, consisting largely of living organisms, forms on the top, which is the real filter. These germs seize on and oxidize all organic matter so completely, and are themselves so incapable of penetrating the layer of sand beneath, that the water thus filtered is far purer than that passed through the purest sand. By this extraordinary means a living filter is constructed, and the bacteria are compelled to do our work just as if they were day laborers or other drudges. Of this water, Londoners consume some thirty gallons per head (being double the amount allowed in Berlin), over 120 million gallons being supplied daily for the direct use of the people.

Upland surface water is very much more purer and better for drinking purposes. It is also very soft, and great cities are increasingly looking to lakes for their supplies, and, if these do not exist, are creating them as needed, often, indeed, thereby rather enhancing the beauty of the neighborhood than destroying it. Liverpool, Manchester, and Glasgow are now all supplied by this means with the greatest success.

As to the springs and wells, the water varies considerably. Of course, all that comes from deep sources is, as a rule, pure, but shallow wells in towns and villages are an unfailing source of disease, owing to their contamination. In cottage gardens we frequently find two holes dug—one for sewage, the other being the well; and in some cases, where the soil is porous, this is deemed a positive advantage as regards the sewage, which leaks out so quickly as to save the trouble of emptying! Where it leaks to is generally the nearest well; and it is perfectly surprising to see how bright and clear the water often is from these "sewage" wells; and not only so, but how the constitutions of the natives can resist the sewage poison for years, though drunk daily. The leakage, which may have been gone on for an indefinite time, perhaps, is only discovered at last by an epidemic breaking out from some disease germs imbibed. Of course the water will not keep, and becomes very foul and muddy after rain.

Deep wells always draw their supply from beneath some impervious stratum, beyond the reach of any surface pollution, and the water often comes from a distance, where the stratum rises to the surface.

An interesting experience near Liverpool shows that the new red sandstone is not always to be trusted. A deep well was bored into it at Liverpool nearly five hundred feet, all being carefully bricked except this part in the solid rock. The result was that, there being large fissures in the rock, the shallow wells, many of them impure, for some distance round, were drained dry into this deep well. The villagers, seeing these wells of no further use as wells, utilized them as cesspools. These gradually drained, of course, also into the deep well, the water of which soon became so foul it had to be closed, a complete system of drainage provided for the district, and it was eighteen months before the water became sufficiently pure to be used.

We may sum up good and bad drinking-waters by saying that springs, deep wells, and upland surface waters are, as a rule, wholesome; that stored rain and lowland surface waters are suspicious, and that shallow well and sewage river waters are dangerous.

Just lately, again, river waters have risen in dispute, for it is found, if free from actual sewage, the germs in them have an antiseptic power rather than a destructive power on the human frame, and are thus more active for good than a pure distilled water that contains nothing but hydrogen and oxygen. It is, indeed, only gradually that we are getting over our insensate horror of all germs, and are beginning to discriminate between good and bad.

Water may be pure and wholesome and yet not palatable. Distilled and boiled waters are instances of this, and the reason of their tastelessness is that they contain no air. They become palatable if poured over toast.

Water is called "hard" and "soft" according to the amount of lime and magnesium salts it contains, if not more than six grains per gallon, or, in other words, six degrees of hardness, it is called soft, if more, it is called hard. If the salt is carbonate of lime, it is called temporary hardness, because the salts can be deposited by boiling; if salts of magnesium, it is called permanent hardness, because boiling does not remove them. The latter is much the more injurious.

It has long since been found that for water pipes inside a house, where so many twists and turns are requisite, there is no material so convenient, so durable, as lead. Soft water, however, flowing through lead pipes, dissolves at once a small portion of the lead, and rapidly produces symptoms of lead-poisoning in those who drink it. One-tenth of a grain per gallon is sufficient to produce them.

The purest, softest waters act most rapidly upon lead; on the other hand, if hard water is used, it forms at once a coating inside the lead pipe, completely protecting it from entering the water. Hard water, therefore, is so largely used, not only because it is so readily attainable, but because it is such a safe water for domestic purposes. On every other ground it is a nuisance.

This protective coating of our lead pipes gives us a hint, if we possess lead cisterns, not to have them scraped when cleaned, so as to remove this coating on the surface, but merely wiped with a soft cloth. Too much zeal in this case might readily do a great deal of harm.

Moderate hard water is not injurious for drinking, and is very palatable; but if it is very hard, and particularly if there be much permanent hardness in it, it is bad, especially for those who have any predisposition to gout.

The appearance of water is absolutely no safeguard; sewage water containing every form of organic impurity, may, as we have said, be perfectly clear, and is very often sparkling. We have also shown that among those who are accustomed to its use it may be drunk with impunity for years, and is even stated to be absolutely fattening! No water is really safe to drink unless its source be known and its purity beyond suspicion, or it be *boiled.*

There seems to be, unfortunately, a not unnatural prejudice against the use of boiled water. It is insipid and not always quite cold. Under the circumstances, the British matron is apt to fall back on the domestic filters. This is, indeed, a disastrous and dangerous error.

A filter, as a rule, is kept in the basement, and, although regularly supplied with water, at any rate when the family are at home, is seldom or never cleaned. Recent researches, unfortunately, show that, whether it be cleaned periodically or not, it is no absolute safeguard, for it has been proved that all ordinary filters, after a day or two, largely increase impurities in the water. They are, indeed, germ manufactories; and water comparatively free from germs obtains innumerable organisms when passing through an ordinary or neglected filter. The idea of straining off impurities by charcoal and other powders is good enough if the water to be filtered contain any impurities coarse enough not to escape; but we may be thankful that all the water supplied to our houses has been already filtered with more thoroughness than we can do it at home. All filters should be banished from the house rather than so used as to accumulate and distribute germs.

There are perfect filters, the use of one of which has decreased the number of cases of typhoid fever in the French army over sixty per cent., and which absolutely strains off all germs. In these filters the water has to force its way through the microscopic pores of unglazed porcelain or fossil clay, which are small enough to strain off the minutest organism. Even these filters have to be placed in boiling water every other day to keep them in perfect order; but this entails very little trouble.

With regard to aerated waters, we must always remember there is no absolute safety in drinking them if they are artificially made. Natural effervescing waters, bottled at the spring, are presumably quite safe. We mention this because so many traveling abroad, and distrusting the water of Continental hotels and restaurants, take refuge in siphons, which may be quite as dangerous.

The two principal diseases conveyed by water are typhod fever and cholera. Nearly every outbreak of typhoid fever has been traced to impure water. If nothing but boiled water were drunk by the community, it would do more to stamp out typhoid fever than any other means that can be conceived. Of course in this we include the water so frequently found mixed with milk. If we are to drink, therefore, nothing but boiled water, it means we must boil all our milk as well.

There can be no doubt that the extent to which typhoid fever still prevails in England is a disgrace, for it is not only a preventible disease, but one without any redeeming quality. It kills people quietly, in large numbers, without any sensation; therefore, people are not as afraid of it as they should be.

Cholera differs from this *toto cœlo.* It is undoubtedly our best sanitary inspector. Most of the drastic reforms that have been carried out in sanitation throughout Europe have been suggested by Inspector Cholera. This disease is still a terror; and so long as it continues so, it is difficult to say whether it destroys or saves the most lives. All our ports have been put in drawing-room order, under the orders of this Inspector.

Cholera is undoubtedly a water-borne disease. The classical case that inaugurated the epidemic of 1866 is well-known. A man in Southampton traveled up to town and took lodgings in a house in the north-east of London, near the Lea. He there had a mild attack of cholera, with the result that the water of the river was contaminated. The water company that derived its supply from this polluted stream unfortunately happened at the time to have its filtering-beds out of order for twenty-four hours, with the result that the cholera germs were distributed widely enough to cause the deaths of 16,000 people. Of course, if the 16,000 had boiled their water they might have escaped. It does not matter where we go, whether to India, Mecca, Hamburg—where the last outbreak left its plainly written lesson—or Marseilles, the epidemic is caused and spread by drinking dirty water.

The river at Marseilles receives its cholera germs in a remarkable way. Twenty corn-mills discharged their refuse into it, the corn coming from Russia and India, where it had been trodden out and handled in cholera-stricken districts. The condition of the Holy Well at Mecca is wholly indescribable in these pages.

Perhaps, indeed, we have said too much already; and yet it is not too much if it leads every reader henceforth to forswear unboiled water, unless derived from a known and perfectly pure source.

FEVERS OF THE SOUTH.*

YELLOW-FEVER is now a rare visitant in the South; small-pox occurs only in local outbreaks; typhus fever has not been seen by the present generation of physicians; cholera has not been epidemic since 1866. Gradually but surely the great epidemic diseases have been driven from the land. Even malaria has diminished extraordinarily in its extent and in its intensity, particularly above the latitude of Norfolk.

Thus one only of the continued fevers persists, almost in its original vigor. Typhoid fever is to-day in the United States, *the fever*, just as it was when the old New England physician recognized its recurrence year after year with the fall of the leaves. Of no disease is the history better known; the measures for its prevention are everywhere recognized; the incidence of its occurrence is an unfailing index of the sanitary intelligence of a community. With good drainage, pure water and pure milk, typhoid fever goes the way of typhus and cholera. The greatest sanitary triumphs of the century have been in reducing to a minimum the mortality from this disease in the great centers of population in Europe. The mortuary returns of Washington and of Baltimore, and of many smaller cities, demonstrate that we are culpably negligent in allowing this most easily preventible disease to continue its ravages. I estimate that in the latter city there were during the year 1895 not less than 2,500 cases.

A practitioner of the Nathan Smith type, a man who had the confidence of his patients, will carry through a majority of his fever patients without a single dose of medicine, not a purge, not a vomit, not even a fever mixture. He is a patient, anxious spectator of a process he cannot arrest, a watchful guardian who will know when to act with promptitude and decision and when to refrain. Would that worthy successors of this good old man (whose article on the typhus fever of New England shows him to have been a true disciple of Sydenham) were more numerous. Some of us insist, and I am one of them, that in hospital practice a cold bath every three hours when the fever rises above a certain point, saves from 8 to 10 per cent. of the cases; while there are others—*quot homines, tot sententiæ*—who put their trust in purges, or who undertake to disinfect the twenty feet of bowel with drugs whose chief virtue is their harmlessness.

RENAL DIABETES.[1]

DR. KLEMPERER, in a communication to the Society of Internal Medicine of Berlin, stated that the studies of recent years had established the fact that diabetes is not an autonomous affection, or, in other words, that it may result from disease of different organs. In these conditions it might be asked if, in addition to pancreatic, hepatic or nervous diabetes there does not also exist a renal diabetes, that is, a diabetes dependent upon renal disease. This question is all the more legitimate since it has long been recognized in England that in diabetic patients attacked by nephritis, glycosuria disappears as soon as the kidneys become the seat of a granular atrophy. Dr. Klemperer himself had observed a similar case. The patient was a man who for many years had been under treatment for diabetes. He was lost sight of, and subsequently found in a hospital which he had entered on account of symptoms of nephritis, but without glycosuria. The patient at last succumbed to an attack of uremia.

This fact of the disappearance of sugar in consequence of renal lesions should, according to Klemperer, lead us to believe that the healthy, or comparatively healthy, kidney has, among other functions, that of eliminating sugar. The manifestations observed in diabetes produced by phloridzin support, in the opinion of the author, the same theory. It is known, for instance, that when large doses of phloridzin are given to animals or men glycosuria is the result. Now, while in diabetes glycosuria is preceded by a manifest glycemia, in glycosuria consecutive to the administration of phloridzin, this accumulation of sugar in the blood does not occur, or, in other words, in artificially produced diabetes the kidneys eliminate the sugar which is normally found in the blood.

---

* William, Osler M. D., in the *Journal of the American Medical Association*, May 23, 1896.

Certain experimental observations lend support to this idea of the elimination of sugar by the kidney in cases where phloridzin had been used. Zuntz has likewise ascertained that if phloridzin is injected into one of the renal arteries the elimination of sugar will, for some time, take place only by the corresponding kidney. Klemperer has demonstrated that the diet has no influence upon the glycosuria caused by phloridzin. The conclusion drawn from these facts is that phloridzin diabetes is a renal diabetes, that is, the glycosuria in such cases is the result of a special irritation of the kidneys by the phloridzin. Again, if this glycosuria is a reactional manifestation of the healthy kidney it should be absent in those cases where the kidneys present lesions or, at least, certain lesions. In order to elucidate this point, Klemperer gave phloridzin to ten patients suffering from granular atrophy of the kidneys. In only three of these did glycosuria result.

Phloridzin is not the only substance capable of causing glycosuria. According to Jacoby, caffeine possesses the same property. The mechanism of glycosuria consecutive to caffeine, is, however, in the opinion of Dr. Klemperer, altogether different from that due to phloridzin. Klemperer particularly points out that with caffeine glycosuria is produced only if a diet rich in hydrocarbons is given at the same time and also if there is a coincident abundant diuresis. In these conditions the glycosuria may be explained by the accumulation of sugar in the blood and its rapid elimination by the kidneys. The same phenomenon in the same conditions may be witnessed with other diuretics, as digitalis, calomel, warm water injections, etc.

In conclusion, Dr. Klemperer insists upon the importance, from the clinical point of view, of the diagnosis of renal diabetes. In such cases, in fact, a special diet is useless since the administration of hydrocarbons, and even sugar, does not increase the glycosuria, and, therefore, therapeutic efforts should be addressed to the kidney.—*La Tribune Medicale.*

THE DISINFECTION OF ROOMS BY SULPHUROUS ACID GAS.*

By **Henry Kenwood**, M.B., D.P.H., F.C.S.

Medical Officer of Health, Stoke Newington, etc

One so frequently sees the common method of disinfecting rooms with sulphurous acid gas referred to in such terms as "inefficient," "unscientific," and "useless," that many health officers must, like myself, have experienced doubts as to whether it was not their duty to discontinue it; on this account I concluded that a profitable discussion might follow upon a short paper on a subject of such importance.

Now it is claimed mainly on bacteriological grounds, that the process is inefficient; that the SO_2 generated by the combustion of 1 lb. of sulphur in 1,000 cubic feet of space is not sufficient to kill the specific organisms of infectious disease, more especially when no measures are taken to charge the atmosphere with moisture. If this be taken as a scientific fact then it is evident that the process must fail in practice. Does it do so?

I have searched most carefully for the evidence furnished during the year (1895) in a population of 254,000 people, that is, I have collected the available evidence from six sanitary areas in and around London, and of course in every case sulphurous acid was the disinfectant employed. In order to make out the worst possible case against the method, suppose we adopt the view that all further cases of scarlet fever and diphtheria which occur, on the same premises, within fourteen days of fumigation of such premises, are due to imperfect disinfection, and even then it will be found that the number is very small. There were, in all, 1,330 premises disinfected by the local authorities above referred to on account of these two diseases, 409 in respect of diphtheria, and 921 in respect of scarlet fever; and altogether there were 55 cases of either scarlet fever or diphtheria which would come into the above category, So that if we take this extreme and unjustifiable view, sulphurous acid disinfection broke down 4.1 times in every 100. This fact will serve to show that if disinfection is necessary at all—and there is no difference of opinion upon that point—then our common and official method is not "useless."

---

*British Medical Journal.

But think of the other possible cause that may account for the origin of much of this 4.1 per cent. of further cases arising on the same premises within fourteen days of disinfection. There is the possibility of infection from the preceding case; there may be a persistence of the same source of infection which accounted for the disease in the original case; there is the chance of coincidence that No. 2 case may have contracted the same fever away from the premises in question within the period above specified; and even the return of clothes and bedding from the disinfecting station would all have to be excluded as possible causes. It is impossible, of course, to say to what extent the 4.1 per cent. of cases would be reduced if all these other possible causes of infection could be taken into account; but it may fairly be surmised that the reduction would appreciably reduce this already small figure.

It is, moreover, necessary to bear clearly in mind that what we ask of sulphurous acid is that it shall disinfect the walls, ceiling, floor, and bare surfaces in a room. No one contends that the method—any more than the French and German official methods—has sufficient penetrating power into bedding, clothing, carpets, curtains, etc. These can and should be removed for steam disinfection.

It has been seen to be very rare that sulphurous acid disinfection fails in actual practice; and may not the small percentage of cases in which it possibly does do so be accounted for by the fact that it is sometimes asked to penetrate and disinfect certain fabrics left in the room, or else that 1 lb. of sulphur has been asked to disinfect the room, perhaps very imperfectly sealed up, of more than 1,000 cubic feet capacity?

Now our method consists of two stages: first, the charging of the atmosphere from six to eight hours with about 1 per cent. of sulphurous anhydride gas, by means of burning 1 lb. of sulphur to every 1,000 cubic feet of space in the room; secondly, the thorough aëration of the room.

The second stage is an essential part of the process in order to rid the room of SO_2. By some it has been argued that it is this thorough aëration that does the good, and not the preliminary sulphuring. I do not see how this statement can be reconciled with our knowledge and experience of several pathogenic organisms (including that of diphtheria). It is easily demonstrable that the diphtheria bacillus would be at most attentuated by such aëration, and not killed.

But is it a fact that the charging of the room with about 1 per cent, of SO_2 is a useless expedient as a means to the destruction of the specific organisms with which we are practically concerned?

Many experiments have been performed in England, Germany, France, Austria, Italy, and America, to test the disinfecting power of SO_2, and the literature of the subject is voluminous. Unfortunately there is a remarkable amount of discrepancy in the results obtained by different workers. I know of no experiments, however, in which an ordinary room was taken, and in which, prior to its disinfection by the official of the sanitary authority, the germ of diphtheria (a characteristic and readily recognised organism both in its cultural and morphological characters) was properly exposed to the SO_2 for from six to eight hours.

The bacilli have sometimes been protected in folds of cloth, etc., sometimes exposed in Petri dishes and even test tubes, partially buried in nutrient media, and the spores of B. anthracis and other very resistant growths have been employed; and then adverse opinions upon the efficiency of the method have been arrived at because exposure to 1 per cent., or even 5 and 10 per cent. of SO_2 has failed to disinfect.

But in practice we do not ask SO_2 to penetrate thick fabrics, and we do not have to disinfect rooms for the spores of anthrax—in fact, so far as we know, there are no spores concerned in the production of diphtheria, scarlet fever, croup, puerperal fever, small-pox, and measles. For these reasons many of the opinions formed are of little weight as affecting the efficiency of the process for the purposes to which it is applied, and many other opinions are discounted by the fact that it is fair to assume that the specific organisms concerned in these diseases do not find in their natural media anything approaching the protective and fostering properties of the nutritive media on which they are planted in the experiments.

Now, Mr. Walter D. Severn has given me his valuable collaboration in a few bacteriological experiments, and I am much indebted to him for the care and trouble which he has taken. In these experiments we principally directed our attention to the Klebs-Loeffler bacillus of diphtheria, for the following reasons: It is concerned in the production of one of the diseases in which the disinfecting power of SO_2 is most commonly relied upon. It is easily cultivated, its cultures are ummistakable, and owing to the rapidity of growth over accidental impurities in the culture media employed, it is an extremely convenient organism to employ in experiments of the nature undertaken.

The room employed in these experiments was in my own house. It was nearly square in form, 8 feet 8 inches in height, and had a capacity of 2,004 cubic feet. Before each experiment the room was left at rest for some time, the inoculated swabs, etc., were then placed in position, and the room was then treated by the man who does the disinfecting work of the parish, precisely as if there had been a case of infectious illness in it. Each experiment comprised six different tests applied at the same time at three different levels in the room—that is, two at the level of the floor, two on a sideboard 3 feet 8 inches from the floor, and two on a bracket 6 feet 6 inches from the floor, and the experiment aimed solely at determining the effect produced by six to eight hours' exposure to an atmosphere containing SO_2 not exceeding 1 per cent.

The apparatus used was very simple, and consisted of (*a*) swabs. These were pieces of glass rod drawn out and fused into a ball at the drawn out end, with some cotton wool carefully twisted round the narrow part to a little over the diameter of the wide part of the glass. A second thick band of wool was well twisted round the rod lower down to serve as a plug for the protecting test tube used to cover the swab. The whole arrangement was sterillized in the oven, allowed to cool, and inoculated with a lively specimen of B. diphtheriæ as soon as possible before using, by gently passing the wool over the sloping surface of a serum culture. These swabs were taken into the room, and the protecting tube removed, thus exposing the bacilli on the wool to the direct action of the SO_2. Afterwards the swab was well rubbed on the surface of a sterile serum tube, which was placed in the incubator at 33° to 35° C., to ascertain if any development of B. diphtheriæ took place. The swabs were made with supports formed by bending the free end of the glass rod into a triangular base.

(*b*) Lints. These were pieces of lint, 2 inches by 1 inch placed in Petri dishes, two in each dish, which was then sterilized in the oven at 160° to 180° C. One piece of lint received with a sterilized platinum spatula needle a streak of B. diphtheriæ, and the other a streak of either staphylococcus aureus or streptococcus pyogenes. The lid of the dish was removed in the room, and replaced after the fumigation. Then each piece of lint was rubbed on the surface of Loeffler's alkaline serum bouillon and hydrocele glycerine agar, and the tubes were placed in the incubator.

RESULTS OF THE EXPERIMENTS.

Each special test in each of the four series of experiments was duly controlled; thus, for every two or three swabs used another similar swab was kept, after being infected for a similar period, and rubbed on to the surface of the nutritive medium at the same time as the swab which had been exposed to the SO_2. Similar checks were applied to the pieces of lint. The control tests showed active and typical growth in every case.

In the first series all three swabs and all three lints were sterile.

In the second series a serum tube inoculated from one swab showed a late (inhibited) growth of the Klebs-Loeffler bacillus after three days, but no growth was obtained from the other two swabs or from the three lints.

In the third and fourth series no growth of B. diphtheriæ was obtained from any of the swabs or lints.

In one or two instances out of the twenty-four experiments made, growths of aërial impurities appeared in the culture media; but neither of the forms of staphylococci or streptococci grew in any of the experiments after disinfection. In the first three experiments Petri dishes of solidified serum inoculated on the surface with streaks of B. diphtheriæ were also employed as a further experiment. In all but two cases (one in each of the first two series) these, somewhat to our surprise, were also rendered sterile, and in the two instances referred to the growth was markedly inhibited.

In Series 1 and 2 one tin of liquefied SO_2 alleged to contain 20 ounces, was employed in each case.

In Series 3 two such tubes were employed.

In Series 4 two sulphur candles were burnt, each containing 1 lb. of sulphur.

After each of the four experiments the room was entirely freed from the SO_2, and then exposed again to the disinfectant precisely as it had been in the experiment, and, after four hours I entered the room with my mouth and nose protected by a handkerchief moistened with a solution of washing soda, and took a sample of the air towards the centre and at the level of half the height of the room.

The samples were hermetically sealed and removed to my laboratory, and the whole of the SO_2 was removed by means of a dilute solution of bromine in water, and the sulphuric acid was then precipitated as barium sulphate.

The precipitate was collected, washed, dried, and weighed, and the original SO_2 calculated. Where one tube of liquefied SO_2, alleged to contain 20 ounces, was employed (Series 1 and 2), the sample of air, taken after four hours, furnished: Experiment 1, 0.26 per cent. SO_2; experiment 2, 0.25 per cent. SO_2.

Where two tubes of liquefied SO_2, each alleged to contain 20 ounces, were used (Series 3), the air showed 0.50 per cent. SO_2. Where two sulphur candles, each alleged to contain one pound of sulphur, were employed (Series 4), the sample furnished 0.88 per cent. SO_2.

CONCLUSIONS.

Therefore, where the bacillus diphtheriæ was not killed, it was very markedly inhibited, even where the SO_2 did not much exceed one-quarter per cent., and the bacillus was killed where the SO_2 exceeded one-half per cent., the above figures have sole reference to the SO_2 in the air in the centre of the room at a height of 4 feet, and after the lapse of 4 hours.

In the face of these facts, is it necessary to make a change? and if so, is one of the Continental methods preferable to the employment of a gaseous disinfectant?

In France, the official method is to moisten walls, floors, and whatever cannot be removed from the room and taken to the disinfecting station, by means of a spray of a 1 in 1,000 solution of the perchloride of mercury. The spray is produced by a portable force pump fitted with a long nozzle, and the apparatus is called a "pulverisateur." The operation of disinfecting a room only occupies one hour.

The German official method is to rub down the walls with bread; ordinary German loaves forty-eight hours old are employed, cut into pieces six inches square, with the crust at the back to afford a firm hold. The crumbs having been swept up and burnt, the walls and ceilings are thoroughly sprinkled with weak carbolic solution, and the floors and furniture are washed in this solution. Both methods appear to be efficient.

The great advantage of our official method over those of France and Germany is that the work cannot be skimped. By the use of sulphur candles, tubes of liquefied SO_2, etc., it can be ensured that the regulation amount of sulphur should be employed, and the room cannot again be used until abundance of fresh air has blown through. If we adopted either of the above methods there is a tedious and direct application of the disinfectant by an individual, and the absolute disinfection of every square inch is dependent upon his thoroughness and his patience ; Now it is a general practice to appoint a single man to carry the work of disinfection for the reason that he does not run the risk of carrying infection back to a wife and family, and young single men of the laboring class generally require a considerable amount of supervision of work entrusted to them; in such an important work he would require constant supervision, and in addition to this at least two men would be required to do work that is now performed by one. These are, in my opinion, weighty objections to the adoption of the French and German methods, which far outweigh the advantage gained by the great saving of time and the very questionable greater efficiency that is claimed. I believe, then, that in practice it is wisest to retain some method, which, like our official one, is simple, cannot be skimped, necessitates the exposure of the room to abundance of fresh air and the actual disuse of the room for many hours. Disinfection by chlorine, formaldehyde, and vapourised carbolic are good, and would also meet requirements, and there is evidence that the first two are more efficient than SO_2; but is one justified by facts in recommending any change at all?

Sir Charles Cameron had, twenty-four years ago, made experiments on the action of dry sulphur dioxide and chlorine on vaccine lymph, and found that they only produced effects when used in large quantities, but solutions, even when used in very small quantity, destroyed the virus of vaccine. Lately he had in many cases used the spraying method for the sake of the delay it saved the occupiers. He complimented Dr. Kenwood on the method of his experiments and their results, but suggested that he should make some complementary experiments with the mercuric chloride spray. In Dublin two men were employed to work the spray, two men to scrape walls, etc., and two women to scrub furniture, etc., so that thus the work of disinfection was carried out rapidly.

Dr. Symons (M.O.H. Bath) desired to thank Dr. Kenwood for bringing forward this subject and furnishing absolute proof of the value of sulphur dioxide as a superficial disinfectant. He would be glad to know if Dr. Kenwood had met with any instance of injury resulting to subsequent occupants of the rooms. Compressed gas had many advantages over burning sulphur; but even this agent might be useless in the hands of a careless workman who overlooked any outlet. The mercuric-chloride spray solution had not this disadvantage, and the room could be immediately occupied.

Dr. Groves (Carisbrooke) was glad this subject had been dealt with, owing to the uncertainty caused by recent criticism. If used properly and in sufficient quantity (one and a half pound), sulphurous acid gas was quite efficient. For twelve years he had not known of a recurrent case in his own district after the use of burning sulphur.

Dr. F. J. Allan (M.O.H. Strand) was inclined to think that the influence of sulphurous acid gas had been underestimated, especially when in the presence of moisture. They had not taken into consideration the oxidation and deoxidation which took place. Did Dr. Kenwood find in his experiments that organisms in bedding or clothes were acted upon by the acid? In practice Dr. Allan preferred sulphur candles, but bedding, etc., he exposed to action of the steam disinfector.

Dr. Kenwood, in reply, stated that he knew of no cases of direct injury resulting to persons entering the room after SO_2 had been liberated. Dr. Symons had asked whether the control swabs were subjected to similar conditions of light, etc., as those exposed about the room during disinfection, every care was taken to make the conditions as similar as possible. With regard to Sir C. Cameron's question whether he considered the tubes of liquefied gas more or less efficient than burning sulphur, he believed that one pound of sulphur when completely burnt gave more sulphuric anhydride gas to the atmosphere than twenty ounces of liquefied sulphurous acid gas, and that this gas was more evenly distributed throughout the room towards the end of the six to eight hours.

◆

DISEASES CAUSED BY FOODS.

Dr. Lewin, in a communication upon the above subject, first recalled the case reported last year by Boas of a person who had died after an excessive consumption of roast goose. Boas had admitted as the cause of death an acute dilation of the stomach produced by the quantity of food ingested, but Lewin gives a different explanation of the occurrence. It is known that animals are resistant to the action of certain poisons. It may, therefore, result that the flesh of animals which have absorbed those poisons is injurious. There is, properly speaking, no meat poison, and a fish poison is yet to be demonstrated. Lewin has endeavored to decide this question by experiment by giving to chickens a certain quantity of strychnine, habituating them to the poison and then feeding their flesh to dogs. The latter developed genuine tetanus. The viscera contained no strychnine, but it was present in certain quantity in the muscular flesh. It is known that occasionally organic poisons are found in dead bodies after having exerted their deleterious action. The muscles have, perhaps, never been analyzed.—*La Medicine Moderne.*

◆

AN OUTBREAK OF ENTERIC FEVER DUE TO INFECTED MILK.

By Sir Charles A. Cameron, M.R.C.P.I.,

Medical Officer of Health, Dublin.

In May, 1896, the two daughters of the owner of a milkshop in Meath Street were ill with enteric fever. I visited the place and had the children at once removed and the milk in the shop destroyed. On inquiry I found that the milk was "sold over the counter" except in a few instances, and that the purchasers were poor people whose residences were not known. The business was a small one. I succeeded in ascertaining that fourteen persons who had been supplied with milk from this dairy were suffering from enteric fever. The cows which supplied the milk were out on pasture. The water in the dairy was pure. How did the milk become infected? It seemed to be from absorbing exhalations from the dejecta of the patients whilst being carried down the stairs to be thrown into the water-closet or ash-pit. These conveniences were situated in an area at the back of the house and quite close to the room at the back of the shop. The door of this room opened into a very narrow hall, and the dejections were carried past the door, which no doubt was nearly always open. Milk vessels were situated four or five feet from this door. The woman who attended the children might have been the means of carrying the infection, but this seems improbable; she took no part whatever in the dairy work. I placed some enteric dejections close to a vessel of milk, and in ten minutes I found that the milk had become infected, as proved by subsequent cultivations of it. The owner of the shop was prosecuted and fined for neglect to notify the illness of his children.

Dr. Harold Scurfield (M.O.H. Sunderland) asked what test Sir Charles Cameron had used to determine the presence of the typhoid bacillus in milk.

Sir C. Cameron, in his reply, mentioned that the milk had been previously sterilized. —*British Medical Journal.*

◆

GLYCERIN IN AFFECTIONS OF THE STOMACH.

Some years ago Doctor Sydney Ringer recommended the administrafion of glycerin by the mouth in certain affections of the stomach. Acting upon his suggestion, Sir James Sawyer has since treated many cases of painful gastric digestion, such as are usually attributed to subacute or chronic catarrh of the gastric mucous membrane, with glycerin, and with satisfactory results. So far as he had seen, this employment of glycerin is not widely extended in professional practice, and he has not noticed further reference to it in the periodicals. The familiar routine seems to be a ringing of changes upon bismuth, alkalies, acids, and digestives. Many cases of gastric maladies of the kind indicated yield to glycerin. He gives one drachm, a drachm and a half and sometimes even two drachms, with a little of some simple bitter stomachic tincture, diluted to an ounce with water, thrice daily, between meals.—*New York Medical Journal.*

◆

TAPEWORMS OF POULTRY.

The bureau of animal industry of the United States department of agriculture has recently published a bulletin in which our present knowledge of tapeworm in poultry is presented in a concentrated form, richly illustrated with two hundred and seventy-six carefully drawn figures, while the ample facts are well arranged for reference, offering an excellent foundation for those who desire to take up such investigations. The medical profession and the public can be assured that there are no attending horrors of infection involved in the investigations of Dr. C. W. Stiles, who has compiled this work, and that chicken roasted, boiled, or fried may be prescribed by physicians or enjoyed by ladies without fear or suspicion of danger lurking in this favorite and appetizing dish, for although we must now admit that the presence of tapeworms is very prevalent in turkeys, geese, ducks, fowls, and other birds eaten as food, both wild and domesticated, we have the comforting assurance that none of the tapeworms of birds is transmissible to man, in any stage of its development, and that the presence of tapeworms in the intestines of fowls does not in itself warrant the condemnation of their bodies as an article of food. The life history of the poultry tapeworm agrees with that of other tapeworms: the eggs are contained in the droppings of the diseased animal—the ova are then swallowed by the necessary intermediate host. Within the ova are the six hooked embryos, known as oncosphere; these bore their way into the body of the intermediate host, and are developed into the larval form, known in this case as cysticercoid. This larva, snugly hid in the body of a tempting-looking worm or snail, is innocently swallowed by a turkey, duck, or chicken, and is then developed into the adult tapeworm. One of the most common of intermediate hosts is the minute little crustacean abounding in pond and lake waters, popularly known as the water flea.

These water fleas are so commonly bearers of the parasites that geese and ducks are found to be infested with no less than five different kinds of tapeworms, which have obtained entrance to their bodies by means of the ingested fleas. It is, therefore, a merciful provision of providence that the human family is proof against contagion of this character, which is fatal to so many birds, but the fact nevertheless offers a strong argument for freeing by perfect filteration all drinking-water from contamination. The treatment for poultry tapeworms is much the same as for those found in man, the chief drugs employed being extract of male fern, turpentine, powdered kamala, areca nut, pomegranate-root bark, pumpkin seed, and sulphate of copper. Dr. Salmon offers a word of warning advising that the above drugs should be as fresh as possible, as failure in treatment is often due to the fact that old drugs have been used which had lost their anthelmintic value. The suggestion is a good one, and causes us to wonder how often the good work of the physician is rendered abortive by his prescriptions being prepared with drugs which are the remnants of an old stock and impotent for good.—*Med. Kecord.*

GASTRONOMIC NOTES.

Dr. Dupoury, a French physician, considers, in an article printed in a Paris journal, the hygienic value of fruits. While he concedes to them an important place in alimentation, he depreciates their nutritive importance. To sustain his contention, he quotes Brillet-Savarin, who finds it difficult in our present state of civilization to imagine a people existing exclusively on fruits and vegetables. Such a people, Savarin believes, would inevitably succumb to those who ate meat; the Hindoos, for example, were easily vanquished by every carnivorous nation by whom they were attacked. Savarin cites other cases, where races devoted entirely to a fruit and vegetable diet have encountered a similar fate, and were held in bondage until they adopted the food of their conquerors, when they became valiant and aggressive. That a meat diet is not always productive of this result, we have an example in the Highland Eskimos, who subsist entirely on flesh, but are peaceful, unwarlike, and gentle to the highest degree. Dr. Dupoury divides fruits into five classes, each of which possesses a special hygienic value—the acid, the sweet, the astringent, the oily, and the mealy. To the first, including cherries, strawberries, raspberries, gooseberries, peaches, apples, lemons, and oranges, he accords great merit. Cherries, however, he prohibits entirely to those affected with neuralgia of the stomach. Strawberries and raspberries he recommends warmly to those of bilious, plethoric, and gouty temperament, and denies them to those in whom diabetes is present or suspected. Of the sweet fruits he considers that plums are of special hygienic value, and even a preventive in gout and articular rheumatism. To the grape he accords the very first place. As this is the season for that fruit, his remarks thereon are particularly applicable. He is an ardent advocate of what in Europe is called the grape cure. In this cure grapes for several days form the exclusive aliment. The patient commences with the consumption of from one to two pounds daily, with a gradual increase to eight or ten pounds. After a few days of this diet a marked improvement in the general health is noticeable. The appetite improves, the digestion becomes easy and rapid, and increased capacity to withstand the fatigue of out-door exercise is noticeable. The grape cure is particularly recommended to the anemic, dyspeptic, and consumptive, in diseases of the liver, and in gout.—*Sun.*

Department of Physical Education,

WITH SPECIAL REGARD TO THE SYMMETRICAL DEVELOPMENT OF THE BODY.

Edited by J. CLARK SLAY, M.D.

ANCIENT GYMNASTICS.

THE following unique contribution was written for the *Journal of Health* nearly seventy years ago: What friction is to iron, exercise is to the body and the mind. As the former will become rusty and decay without use, so the latter will become diseased without sufficient exercise. How many pains and dollars and disappointments might have been saved if patients instead of going to *Doctor Bolus* had only taken, three times a day, half an ounce of common-sense, with *quantum sufficit* of gymnastics.

Before I relate the confession of one who was pretty far gone with the *hypo*, let me attempt a definition of the term *exercise.* In our attempts to induce indolent mortals to make a trial of this most valuable recipe, common-sense and gymnastics, *secundum artem*, a difficulty has been experienced in the patient not distinguishing properly between exercise and labor carried to fatigue. Avoiding all tiresome disquisitions, our idea of exercise may be illustrated by the simple motion of opening and shutting the hand. Give to the several muscles of the body a lively pleasant action, similar to that of the muscle of the arm in the action of opening and shutting the hand, and you then have exercise; but if this action of the whole frame is too violent, or is continued too long, it becomes labor and ends in fatigue. A man may labor and become fatigued at many employments and yet not be exercised, as in the case of the tailor and the blacksmith.

But to the case of the *hypochondriac:* This individual, from a variety of causes, became exceedingly depressed in mind; his vigor, mental and physical gave place to listlessness and lassitude, a very *ennui;* he sought repose late at night and found it not, and he tarried long on his couch in the morning and rose with fatigue; he spent the day in sauntering from place to place in search of desultory amusement and returned with languor; he tried to read but found nothing interesting, but lying puffs and equally veracious affidavits in favor of quack medicines, panaceas and catholicons; in a word, he lost his common-sense and found a morbid quackish sense; he took certain cures for the incipient stage of dyspepsia and found himself affected with—alas! a host of symptoms of all sorts of disorders; he went to sleep to dream of elysium and had visions of pandemonium: he was, on a cloudy day, beset with demons, black and blue, and visited by spirits, brown, white and gray, all these combined filled him with present fears and with imaginations of future evils still worse from which he sometimes found relief in a flood of womanish tears.

It was in this state that he was met by a friend who sympathized with him and soothed his mind into a tranquil state. The person informed him that he had two years before been in a very similar condition and advised him to try a quantity of common-sense and gymnastics two or three times a day. By administering a portion of kind words, with a spice of flattery and a goodly proportion of reasonable and sympathetic counsel, he was induced to make a trial of the remedy. He began with a good resolution and very soon experienced much benefit, so much, in fact, that in a fortnight he was like a man in another world, or, as the domestic dame said of the pigs after she had fed them on corn and brimstone, they were "*quite another kind of creters.*" Action and exercise made him well. One thing, however, it is proper to observe, he began with too violent a degree of exertion, so much so that the muscles of the breast and arms were as sore for a week as if they had been beaten with sticks. He, however, persevered and acquired strength of body, animation of mind, courage and mental vigor. While in his former state he complained of a *confusedness in his head* and found his memory very seriously affected. Now the difference is very great; his memory is restored and even stronger than before; his mind is active, his temper more uniform and cheerful even when his *purse* is very slender—a circumstance, all must admit, no way favorable to cheerfulness.

Oh! Messrs. Editors, if you could only persuade a goodly number of our citizens, young and old, rich and poor, male and female, to put in practice this simple prescription there would be less need of going to the springs or to the falls of Niagara "*for the benefit* of their health." Health, sirs, is the twin sister of contentment and you need not travel far to find them both, if they will not come and dwell within your own bosom, you may as well save your travelling expenses to provide for your funeral rites.

It may not be unprofitable to observe that the converted *hypochondriac* now really enjoys life, and has done so for many months and some long years. In a word, he has adopted, both for the health of the body and of the mind, the laconic answer of Demosthenes as to the three essentials to oratory, Action! Action! Action! Only be cautious to preserve an equilibrium of action between the body and the mind and all will be well from the "crown of the head even to the sole of the foot." With this as a leading principal, he rises early in the morning, even before the sun has had a chance to peep into his chamber, applies then to every part of his surface a good stiff brush with a quick motion; next sets about his lustration, dealing the water liberally, even to the furthermost parts of the body, and finally goes to his *brickbat operation*, that is, he takes a brick in each hand, stretches his arms to the full, in a horizontal position, and throws them back as far as he can. This motion opens his chest, allows a full supply of air to enter every cell in the lungs, promotes his appetite for breakfast, and, it may be added as a consequence, prevents that fashionable complaint, *dyspepsy*. These methods and motions are put in operation during the day as often as occasion may require, or any approach of that foul fiend *ennui* may render necessary. Though it is seldom, except on a very hot day, that he needs it more than twice, at any rate three times a day will be sufficient for the sedentary. By the above process, this converted *hypochondriac* is now a uniformly cheerful, good-natured, healthy, middle-aged man.

◆

MODERN RESPIRATORY ADVANTAGES.*

By W. T. English. A.M., M.D.

Professor of Physical Diagnosis in Medical Department of Western University of Pennsylvania, and Consultant in Chest Diseases in the South-Side Hospital,

Pittsburg, Pa.

The worker in the domain of preventive medicine often has occasion to feel that there are excuses for becoming pessimistic and for regarding his efforts as unprofitable. After some acute outbreak of disease, his heart is wrung with disappointment and his mind is distracted. A good remedy for such hypochondriasis is to re-

---

*Read in the Section on State Medicine, at the Forty-seventh Annual Meeting of the American Medical Association, held at Atlanta, Ga., May 5-8, 1896. *Journal American Medical Association.*

hearse for himself, or have another review for him, some of the modern respiratory advantages, and trace them to their source. All men are not alike possessed of the "vision and faculty divine," but that man must be indeed prosaic whose soul is not inspired with gratitude and whose heart is not uplifted with hopefulness as he beholds the human body rapidly and surely raised from the abnormalities of life, sublimated, refined and sacred through the avails of modern respiratory advantages. The individual who labors in the realm of preventive medicine is habituated to a life amid the vapors of melancholy and disease, and if no sudden or colossal change dispels those vapors, his mental visualizing is rarely illuminated. However, his efforts are continuously transforming the gruesome abiding places of disease into places of good cheer, and he is creating an inproved state of existence for himself and his generation. The influence ceases not, but it steeps in splendor the distant human prospect and reaches out its long arms like a benediction toward the ages that are yet to be.

The solicitude with which he guards the youth from the moment he leaves the nursery is like to the fabled spirit of good that keeps from all evil. So unremittingly has he demonstrated the ill influences of bad air and advocated the benefits of good respiration that the school curriculum has been extended to include a study of the laws which govern the respiratory organs, with those which govern other material things. By the intelligent application of the laws of respiration, which the school boy is thus taught to understand, there is not only a continuous development of the breathing apparatus, but an extension and versatility of its functions. The school-boy of to-day knows better how to breathe than does his grandsire. In him is awakened an appreciation of the fact that the respiratory organs were never intended to act as involuntary parts of the body, and it becomes a portion of his daily care to observe that a fair proportion of the 25,000 respiratory cycles are voluntary and forcible acts. This age, so self-conscious in many things, is thus to be secured against lethargic, indifferent and unconscioûs respiration, which has been the cause of much of the pulmonary weakness of the past. The most casual observer will note that it is not our boys and girls who need reformation from respiratory delinquencies, but the fathers and mothers. It is only the children who have learned from their teachers how to use their respiratory organs who really know how to breathe. 'The large majority of those in adult life have never yet learned how to take a full inspiration or execute a forced expiration. They are totally ignorant of what is meant by a voluntary respiration. In consequence of this the average adult never employ the lungs beyond that which is essential to existence, and to those engaged in sedentary pursuits this need is exceedingly small. On the other hand, every child, disciplined to-day in the accepted respiratory school, is capable of taking twice as many cubic inches of air as his parent, and habitually uses his breathing organs with proportionately greater freedom and scope. In comparison with the school children of to-day the parents are a race of pulmonary pigmies.

This constant oversight of the lungs brings with it respiratory fulness with perfect oxygenation that in turn develops material out of which energy proceeds. The augmented lungs and extended respiratory action begets an increased desire for air, and these promote a condition of mind that is emulous of bright surroundings. There is nothing that secures appreciation of hygienic conditions like a personal experience of their benefits. To one thus endowed there is a delicious sense of pleasure in the pressure of the lungs against their confines, and it is not easy to deprive him of his powers to battle with bad air.

These methods of cultivation secure an esthetic and cultured respiratory demeanor and at the same time create a longing for complete and repeated changes of air, much as the cultivated taste of the epicure delights in changes of viands. How young, wholesome lungs do yearn for some new brand of alveola-titillating atmosphere! Moreover the highly educated breathing apparatus has analytical capabilities so that it may appreciate that a molecule of oxygen is an impact of two atoms of the element while it recognizes a molecule of ozone as a combination of three. Furthermore, the lungs feel the corroding energy of the triplet to be many times greater than that of the influence it exerts upon the breathing apparatus exemplifies a higher intelligence than mere automatism. An educated pair of lungs observes that the air is not imponderable and notes the thermometric and the barometric rise and fall. The mind and the lungs together grow familiar with the physical character of the air, its invisible inhabitants, the microbes and their potencies for good or ill, as well as the general and specific qualities of the air dust. If it is true, as is calculated, that in the air of the city a man breathes 37,000, 000 spores every ten hours, it is not from aerial purity that any of the city denizens continue to live and move and have their being. It is also well-known that in the atmosphere everywhere there is an opulence of oxygen and the greatest need is a capacious and intelligently controlled breathing apparatus to utilize it, and at the same time to successfully conduct the hygienic chemistry of the perfect function. The educated and sensitive lungs will isolate the deleterious ingredients more rapidly than the microscopist or the chemist; and those objects entrapped upon the microscopic slide, which appear so interesting and beautiful to the visual sense are altogether unlovable to the breathing apparatus when they gain access within their sacred precincts. This ever-increasing discriminating capacity of the human lungs enables men to remain for a season amid deleterious influences with comparative safety.

It was assumed many years ago that the coëfficient of oxygen needful and belonging to animals was fixed by the animal's intelligence. Thus, a dog required more oxygen than did a hare of equal weight; the chimpanzee, the nearest animal to man in point of anatomic resemblance, needed less than man. Whether these estimates were considered fanciful or not, it is certain that to breathe well to-day is the most modern method of demonstrating advancing intelligence.

Falling in line with this display of wisdom in the exercise and development of the lungs are the efforts that are everywhere made to reduce the aerial threatenings and improve the quality of the air we breathe. But for these efforts the vitiated city atmosphere would be most deplorable in its consequences to those compelled to remain within the urban limits. However, it is only amid such surroundings that we can discover how apparently insensible some persons are to the subtle influence of viscious atmosphere, and observe the variety of means which contribute to counteract the bad air and unhygienic conditions.

The elaborate and perfect system of interchange that has been going on since the world began between the earth, the vegetable and the animal kingdom,with no waste of material, still continues to demand the admiration and thanks of every grateful creature. This is also supplemented by a process of sanitary chemistry—more flexible and variable—by which the actions and reactions of materials and the affinities and aversions of the silent and unseen forces are made to conform in the main to the best interests of human kind through the provisions of the *vis medicatrix naturæ.*

To reinforce these natural efforts at sanitation, every city to-day has in its employ a capable corps of workers whose business is to look after the various impurities. It is the custom in several municipalities to gather a measure of the atmosphere from different portions of the city and force it through materials in which are entrapped the impurities, and these are carefully isolated and estimated, and the result announced. To afford all who desire to acquaint themselves with the relative impurities existing in different localities a record is made at intervals not exceeding one week.

The use of the microscope and other instruments of investigation has become popular amusement, and there is an individual as well as public surveillance of the atmosphere. Through thousands of channels of observation the intelligent layman is accumulating experience that enables him to trace facts and inferences to their logical conclusions, and the good results are constantly multiplying. Knowing that evils exist he seeks to prevent their influence in himself and others, and though his supremest need demands his presence for a season amid the unwholesomeness, he provides himself with a home beyond its contaminations, where he can retire after his daily duties are over, and render his lungs clean again ere he starts them upon their fresh career of defilement. His household is continuously kept amid the respiratory advantages.

Toward the attainment of these possibilities every recent invention seems to felicitously trend. The proper thing is ever more and more becoming the popular thing. In modern street paving there are some remarkable advantages secured to the respiratory apparatus. The myriad crevices favoring the accumulation of dust and offal in the cobble-stone pavements are replaced by the smoother surfaces of the granite and asphalt. These pavements in the streets of the present city make the dust obvious to the street cleaner, and spontaneous removal by rainfalls is facilitated. The frequent use of the sprinkling cart has a salutary effect in lessening the contamination of the respirable air. We have recently bade adieu to the lumbering horse cars and the thousands of horses which contribut to filth of every city. The dust, the offal, exhalations, effluvia, gas and odors innumerable incident upon the vast herd of horses upon the streets are no longer with us. By the electric and cable cars thousands of horses in addition to those formerly employed by the horse-car companies are rendered unnecessary. The commodious and wholesome rapid-transit cars are a desirable means of conveyance and the great celerity of travel yields additional advantages by expediting business, social and pleasure trips. By the reduction of evil long prevalent, and the substitution of the most royal good, they contribute to modern respiratory advantages beyond computation.

The more recent methods of city illumination has done much that is favorable to wholesome activity in the breathing apparatus. Tne old-time fish-tail gas jet, capable of consuming as much oxygen as several persons, is substituted by the electric light. This is especially noticeable in assembly rooms. By the use of electric light there is no oxygen waste and no products of imperfect combustion. Its universal employment would cause an oxygen saving to every city sufficient to supply twice the number of its inhabitants with good wholesome air.

In the matter of heating, the respiratory organs are considered. The air is not permitted to become gloomy with smoke and other evidences of imperfect combustion, and the smoke-consumer is voluntarily or legally adopted. In the homes we can have our apartments warmed by the moist or dry methods and can so arrange that there will be an equable continuous dry atmosphere, free from dust. Again, we may imitate the barometric rise and fall to suit our fancy or gratify our wish. In the districts where natural gas abounds the air can be kept free from smoke by its employment as a fuel and without even the annoyance of dust from ashes. Some of the more recent methods of supplying air and heat to modern buildings embrace advantages that are destined to lift us out of the empire of death from aerial impurity. The air is drawn by fans through closely woven silk screens or forced through baths which wash and render it aseptic. The shafts into which the atmosphere is drawn are extended to a high altitude to avoid the dust and contamination. After gaining admittance to the basement it receives the desired barometric and thermometric qualities before it is delivered throughout the building. In each room is placed an indicator, with a movable needle, by the least motion of which the temperature of the apartment can be changed. This adjustment resembles that portion of our timepieces which enables us to regulate its speed. Hundreds of other aids and means of protection to the developing breathing apparatus can be observed in modern city building.

How eminently fitting that an age which protects and fosters its respiratory good should form a remarkably close alliance between its pastime and its business. Wherever we go on a Saturday afternoon we find the city denizens hastening, by every avenue, from the crowd and tumult into the more rural surroundings. The old dead roadways, that a few years ago were overgrown with weeds and grasses, teem with cyclers, and the little town along the way lifts up its head again as if possessed of a new life. The glorious half-holiday rescues many a failing respiration from the thraldom of disease. To take a stroll or join in some of these methods of oxygen hunting, or spend the Sabbath amid nature's wholesomeness, is to serve God. A half century ago this would have seemed sacrilege, and the Saturday half-holidays would have been regarded by our grandsires as sinful and profligate. But this is the end of the nineteenth century, and the world is growing young again through its modern respiratory advantages.

Cricket, football, baseball, tennis, golf, fishing and athletics generally are familiar to every place and are regarded as suitable pastimes for all young Americans. How they have aided in the resuscitation of some of the yielding respiratory organs! It is not the school-boy, neither the idle men of means who are interesting themselves in these sports and pastimes, but the masses. The countless excursions by rail or water are daily inviting a willing humanity to bathe their bodies in the sunlight and purify their lungs in the aerial change. Whatever morsel of air or quality of atmosphere one desires may be secured by application to the numerous competing land or waterways, and he will comfortably, cheaply, and with great celerity, be transported to the Eldorado of his desire. With these new experiences and ever-changing quality of the respired air, the lungs not only develop their vital capacity, but acquire a versatility in their methods of accommodating themselves to the aerial circumstances. There is undoubtedly a remarkable adaptability by which the lungs may adjust themselves to the conditions. And this serves their possessor in good stead when it is impossible to select the environments, because the respiratory versatility enables him to breathe the disease-ladened air with comparative impunity. Man is to-day capable, for the most part, of educating and subjugating nature, and when the surroundings are at fault he makes or modifies them; failing in this, he can rely upon the discriminating care acquired by his lungs to render the atmospheric foes inert.

Through all the avenues of hygienic information the truth is being ever more and more impressed that pure air and exercise are equal forces acting in the same direction. The contaminations from disease germs and terrestrial impurities are to be met by an equal antagonism vouchsafed through the intelligent employment of the functions of respiration. Meanwhile most of us agree with Lord Beaconsfield that "the atmosphere has more to do with human happiness than all the accidents of fortune and all the acts of government."

The adjustment of the respiratory possibilities to the needs of each individual is largely a matter of his own choosing. There are some who have tarried too long under the lethal influences of indifferent respiration, and have in consequence bartered their birthright. Some again there are whose lungs, like the Scotch farms of which we read, are "poor by nature and ruined by cultivation." There may be no regal duty for such to perform but even these can hold from future human struggle the burden of preventable suffering by negatively remaining away from the current of human life that is to-day flowing so directly toward the goal of physical completeness.

DISCUSSION.

Dr. Kellogg—In a certain school there was considerable difficulty in persuading the Indians to attend. I thought they would be glad to avail themselves of the opportunity. They were still in a primitive state and were running about in the forest absolutely nude. There was a lot of Indians who thought it unhealthy to be in the house, and took their children away on that account. It was instructive to me to see that they were so solicitious about their children's health.

He said we did not know how to breathe unless we learned it at school. I found the best teacher for breathing was a baby. The good Lord told them how to breathe just right. I have told many ladies that the best of their breathing powers were tied up; and that if they wanted to learn how to breathe to take a baby and lay it on a bed, and notice how it breathes. I say breathe with the whole trunk. When he breathes the whole trunk will be inflated.

Women breathe with the upper and men with the lower part of the body. What all need is full respiration of the entire chest. I have two little boys and I frequently make them run up and down stairs once or twice to make them breathe properly.

I formerly practiced voluntary respiration, but I am convinced it is not a success. Simply breathing or exercising for the sake of it is tiresome. I have not been able to breathe voluntarily more than two or three minutes at a time. The muscles very soon get tired. But if you will compel yourself to breathe by bicycle riding, jumping up and down, room exercise, or anything else that will create a demand for pure air you will find that it is not so tiresome. The lungs will act in the most vigorous and voluntary manner. For the last seven years I have used gymnasiums for my patients with excellent results.

Dr. ——, in some experiments made in the Dangerfield Academy, showed that after six months exercise in the gymnasium he found that the involuntary activity of the lungs was doubled. It became twice as great while the students slept, showing that the effects of gymnasium work are continuous during sleeping as well as waking hours.

There is another point: The position assumed in sitting. A lady said, "I want to talk to you about my lungs. My mother thinks I am to have consumption because I have no chest." I made her stand up and she stood with shoulders and chest contracted. A ruler laid on the chest would have touched the shoulders on either side. I made her bend and look upward, and found she had a well developed chest, but was carrying it all behind instead of in front. The lungs had not been properly expanded. In making her stand straight I entirely corrected the deformity. It is becoming a very common deformity. I think it is largely caused by sitting on the back instead of the thighs, and it results in people becoming round shouldered. The body is held in this mold for so long a time that it finally acquires a certain degree of permanency.

The doctors ought to be continuously calling attention to standing straight and raising the chest. While standing straight the lungs are expanded, and the abdominal viscera trained up. Walking, boxing, bicycling are agreeable and exhilarating, and accomplish these beneficial results. They render proper breathing more natural.

Dr. Garber—I have had considerable practice with men who were engaged in blowing window glass, and it has been my experience, that forced exercise will cause great development of the chest. In 500 glass blowers I can not remember a single case of lung trouble. I used a respirometer on some of the men, and found they can inhale 300 cubic inches of air, and I frequently found a difference of five and sometimes six inches between inspiration and expiration. Some people whom I regarded as consumptives have since become well, and lungs predisposed to disease of that kind became strong. I am very much in favor of gymnasium exercise of some kind for all.

Dr. Kellogg—The atmosphere is as important to us as the water that we drink, or the light that shines upon us. I want to ask a question in regard to the consumption of this oxygen; I want to ask the author if he thinks it would materially affect the health of the city to change to electric lights on account of more consumption of oxygen by gas jets than by the electric lights?

Dr. English—I made, some time ago, an investigation as to the consumption of oxygen by the ordinary gaslight jet, and it showed that one gas jet consumed as much oxygen as would supply three ordinary persons. Assuming, then, that we have 100 lights in the assembly room, and 300 persons. We would have consumed by the lights as much oxygen as would have been consumed by the individuals in that room.

When we build a room the area is usually estimated to accommodate a certain number of people, and a building of wholesale emporiums is usually conducted upon the principle that so many cubic inches of air must be supplied to every individual. When we use the electric light, especially the incandescent, we consume no oxygen. The incandescence of the carbon must be considered the source of light. It burns in a vacuum, with no possible oxygen waste. In every city we have a certain proportion of people living in one room. Estimate the number of rooms in the city, and in that way we can estimate approximately the amount of oxygen we are consuming by the use of these burners. Then there is another point; just estimate the amount of contaminations, the smoke, gas, odors, and the various emanations which are contributed to the oxygen by these fish-tail gas jets, and the heat that the gas produces. whereas, with electric incandescent lights burning in a vacuum, we have a brilliant light that is satisfactory, comfortable to the eyes, do not have these contaminations, and we have a minimum amount of heat. The consequence is that we do not vitiate the atmosphere. With arc burners on the streets and in the rooms we would have a much larger result, for one arc burner was estimated to be equivalent to sixteen times the power of the ordinary burner, I believe. The comparison is between the two different kinds of light. The arc burner is exposed to the atmosphere, and consumes a large qunatity of oxygen, but there is no comparison that would demonstrate the advantage that would be accorded the electric light. When we go back to oil lamps and candles and such devices for lighting purposes, they are often worse, because their contributions to the atmosphere are vastly in excess.

It is a fact that we do not in the schools to-day teach the children how to breathe. We should impress upon them that there are vital organs in the human body and that it is within the capacity of our volition to control these organs, these lungs. We may breathe fast or slow as we choose, and take in as much or as little air. We may suspend respiration, but we cannot suspend the action of the mind enough to prevent the use of our lungs. I think Nature has demonstrated by placing these organs within our body it is our duty to use them, or they are indeed not vital organs. By that means Nature secures for us perfect respiration, good sound lungs and a wholesome body.

Dr. Kellogg—I just want to mention three disadvantages: gas stoves, kerosene stoves and gas grates as heaters. A doctor put a kerosene stove in a room and the next day the patient was dead. He told me he was satisfied the patient was suffocated by the odors arising from the stove. The gas stove produces ten times as much impurity as an ordinary gas burner, and a gas grate gives out at least twenty times as much impurity as a gas burner. It seems to me a very dangerous thing.

Dr. English—I would like to ask the gentleman what gas he has reference to—artificial, natural, illuminating or what?

Dr. Kellogg—It is coal gas. That is a hurtful gas. In natural gas heaters as well as in grates, the opening for the escape of the gases is in some scarcely one-eighth of an inch in width, so when the door was opened it was certain to drive all the foul gases out into the room, so that I think it applies to both natural and artificial gas.

The Chairman—I think the general fashion of ladies' dresses is wrong, and that the weight instead of hanging from the hips, as is now the case, should hang from the shoulders. I think until that is done they will never have perfect respiration, and if Dr. English will start a crusade on this line it will result in much better health in every respect, and especially there will be less falling of membranes which the women complain of so much and which gives the gynecologists so much work. They should also have their dresses made so that two or three inches additional would be allowed for expansion of the chest.

Dr. English—I think that the efforts of such reformers as Jenness-Miller have influenced the women, and in my experience—and I have had rather large experience in respiratory difficulties because my special realm is the treatment of diseases of the chest—I find that women are disposed to lay aside their pains and corsets and take up more life and health. I really think if I incorporated that subject in my paper I should have illustrated the women of the future. They are growing sensible as well as the men.

Dr. Drayton—This Jenness-Miller reform is simply a departure from the strict lines of fashion. It is simply an attempt to adapt certain principles of hygiene to fashionable dress. You may get some benefit from it, but it appears to me that the attempt will not be more beneficial than the attempts already made on that line. The new woman will make some difference in this matter of fashionable costume. The new woman likes the bicycle and the woman who rides finds it necessary to adopt a bicycle costume. She finds it is not only good to make muscle in the arms but also in the abdominal region, and after a little practice she would prefer to put her finger in the face of fashion than to give up the wheel. So I think we shall have a great improvement from this cause. I have advised the use of the wheel to a great many ladies. I have studied it and its advantages and I am satisfied its general use will be of great benefit.

Dr. J. A. Work, Indiana—The wheel is not available to all. We should give our women more employment that will have the effect of developing what is claimed for the wheel, which is for amusement, but as a vocation I believe general housework, such as our mothers and grandmothers used to do, would be better for them. I have found that the German servant girls who have not followed fashion have very good breathing apparatus and very good lungs They stand erect and they have employment that compels them to do it. They have to breathe right and they have to clothe themselves right or not do the work required of them. Two young Swedish ladies came to my office for treatment. One wanted to know what was the matter with her side. I put my hand on the side of the chest and told her to take a long breath and her chest shoved up under her chin. She could not expand it around the base of the lungs one-half inch. Under the armpits above the breast she expanded three inches. I said: "That is the trouble with your side; take off your corset and you will breathe well." Let us give them employment that will make them breathe.

Dr. H. E. Garrison, Illinois—I believe I am the only woman doctor present. I have practiced for twenty years and I can ride and walk as readily with as without a corset. Mrs. J. S. Lane has a book upon the subject and if the gentlemen will read it they will know why we have worn corsets and will continue to wear them as long as we live.

THE MISSION OF THE BICYCLE.*

By M. Belle Linkmyer, M. D.

Superintendent of Health for the Ohio W. C. T. U.

The bicycle craze is on and we are treated to rare and racy exhibitions and fantastic doings among men and women, especially women.

We see women so exhilarated, renewed, and intoxicated by this new fad as to do things bordering on the verge of rashness and foolishness; even in their sleeping hours they dream dreams of flying through the air past sylvan glades, through bosky shades, and on and on through town, village, city, and country in kaleidoscopic change. They get to thinking that not only the sidewalks, but old earth itself is their very own. Some of them—the women, I mean—risk life and limb to outdo their male comrades, and, for their pains, get their heads broken. Young women have forgotten their little crazes over silk and wool and linen and go off on afternoon excursions with Tom and George and Charlie, and demure, precise old ladies fold their hands in despair and moan, "Where are our girls coming to?" And a few ladies of an uncertain age, when they see certain other ladies of uncertain age flying by with rosy cheeks and, as it were, renewed youth, talking like girls of 16 with their male companions of 16, or thereabouts, think it is awful that women should lose their dignity.

Poor men! Some of them look on in a jocular mood as they see flying by these undignified beings donned with their own clothes—cap, necktie, shirt, pants, and all. I should say there are a few exceptions—modest, astute ladies, but far more dangerous withal; for that short skirt covers up a pair of pants of the same wholesome and stout material. This is only to let you down easy. Remember, oh, men, the sins of your grand-sires of a century ago! how with an unparalleled vanity they wore woman's furbelows, her ruffles and tucks, her curls and powder. Truly, the sins of the fathers are visited on the children. Checkmate.

Don't be too hard on us. You know the slave was a very tame thing when under bondage, but once when he got a faint whiff of freedom's air he was a new being. This is the first time these spinsters of the bike ever knew what a delightful thing it is to breathe like you fellows, and it is no wonder they are just a leetle bit crazy at times. I always wondered why it was man went wild and crazy-like at political conventions, but, I think, I have solved the problem.

The Lord gave us all things to breathe with,—men take Him at His word and use them to the remotest corner.

We can't say that of women. They prefer whalebone to their own 500 to run their economy, and the consequences are—— Well, they are so fearful and so many I will leave the enumeration of them for a lifetime's thought and work. So we are liable to see all kinds of antics until the modern woman becomes accustomed to the increased influx of the life-giving ether. You say this is a very roseate view of bicycle-riding by women. But while we hold to the point we don't deny the fact that some of the fair ones with more courage than discretion break their hearts, while others break their heads, and still others drop dead from sheer exhaustion. That's nothing; it is only the old story of the survival of the fittest repeated over again. The world will only have a few less fools and weaklings in it. It is the same old, beaten track that men have trodden and trampled one another down sometimes for a meaner cause. The weaklings go down, but the strong, the brave, the true, and honest-hearted have kept right on with a sure and steady pace.

---

* *Annals of Hygiene.*

What signifies the lives and health of a few women, whose lives are for the most part filled with following fads, if the rank and file of our women can be persuaded from sweet experience that this life is indeed a life worth living, abundant in fine possibilities to the woman, who breathes as men do, with every lung-cell doing full duty.

As well declare against the horse because of horse-racing as declare against the bicycle, because a few will not use discretion. Many recreations and amusements are right in themselves, and sensible and decent people must and ought to wrest them from those who, whatever they do, mar the sacredness and rightness of things by their crazing or lewd and vulgar bias.

The time has come when our women, in order that the American race shall occupy the highest pinnacle of physical and, consequently, mental and moral status among nations, shall learn to really enjoy physical health as men do; with a true, honest, refined womanliness, shall exultingly say, I am healthy, I am strong, I am happy. A woman cannot be a pleasant bike companion of her gentleman friend in the regulation-fashion costume of to-day. As a consequence, Dame Fashion gives out from the white city her propaganda; it is, the small waist is no more *en régle.*

All ladies to be in *le mode* must have their waists padded to twenty-eight inches.

To breathe right is to think right. Small waist, small brain, and one cannot help but think in a narrow circle if each brain-cell is continually bathed with deoxidized blood, which is the case with persons of weak lung-action. Mark you, on account of the bicycle, the cigar business is waning, and women pay less attention to toggery, fancy-work, and other crazes. This is a craze that we can happily put up with. Perhaps some of our women can be induced to don more healthful attire. Perhaps she can approach nearer in this way to her brother man, and grow to know him on a different basis from that of a lover or a manufacturer of small talk. If so, then, think of the liberty of mind and body it gives; bicycle clubs with girls and women giving a report of travels by wheel through France and Italy. Such liberty has brought to man his ascendency in power; the same cause will bring rich results to women. No problem, now, is more fearful to contemplate than the chasm of life that separates men and women. It is the cause of the deepest misery that humanity has to contend with. These inequalities of temper, mind, and health must be levelled to bring happiness and well-being. The mission of the bicycle is to help in this direction.

THE ADVANTAGES AND DISADVANTAGES OF THE USE OF STERILIZED MILK FOR INFANT FEEDING.*

THE term sterilized, as applied to milk, has been very vaguely used during the last few years. At first no doubt it was restricted in its application to milk, which had been so treated as to be rendered germ free. Now, however, it is generally understood to refer to that which has been kept for some minutes at the temperature of boiling water. It is in this latter sense that I propose to use the expression "sterilized milk" in this paper. Before proceeding to discuss the relative advantages and disadvantages of this so-called sterilized milk, it may be well to refer briefly to the various methods which have been adopted in order to render milk approximately germ free.

---

* From a paper by H. J. CAMPBELL, M. D., in the *British Medical Journal.*

THE USE OF CHEMICAL REAGENTS.

The following have been employed—carbonate of soda, bicarbonate of soda, boracic acid, borax, salicylic acid, quicklime, hydrogen peroxide, carbonic acid, and formalin. The necessarily small quantities which can be used of the substances have been proved, on the one hand, to be quite ineffectual for the destruction of germs, and on the other they are most injurious to the consumer when taken for a considerable period.

The use of compressed oxygen and the passing of an electrical current through the milk have been suggested as sterilizing agents, but nothing practical has come out of these proposals.

FILTRATION.

Dr. Seibert, of New York, states as the result of a prolonged investigation, that if milk be filtered through half an inch of compressed absorbent cotton, seven-eighths of the micro-organisms contained in it will be removed, and that a second filtration will further reduce the number to one-twentieth. One quart of milk may thus be filtered in fifteen minutes; however, Lewi found that the souring of milk was not at all retarded by this procedure. Of course efficient filtration, as through a Chamberland filter, is out of the question with milk.

Cold is of value for preserving milk for a limited period, but is of no use for the purpose of rendering it germ free.

HEAT.

The various modes of rendering milk approximately sterile by means of heat are therefore, the only ones which are of any practical importance. They may be subdivided into:

(*a*) *Pasteurisation*, where the temperature of the milk is not raised above 158° F.; and

(*b*) *Sterilization*, where the temperature is raised to 212° F.

PASTEURISATION.

Various forms of apparatus have been invented for the pasteurisation of milk in large quantities. These are chiefly of two types; in the one, such as Thiel recommends, the milk is made to flow over a heated corrugated surface; and in the other, the vessels containing the milk are surrounded by water, the temperature of which can be kept at a definite point for a definite period. The first kind of apparatus is almost useless, for, firstly, in order to render it certain that the whole of the milk is raised to a sufficiently high temperature to sterilize it, the metal must be so greatly heated, that the milk which comes into direct contact with it will be scorched; and secondly, the time of exposure to the temperature of 155° is far too short to be effectual. This has been proved by Geuns, who found that milk which had been treated in Thiel's apparatus still contained from 5,000 to 9,000 bacteria in every ten drops. If pasteurisation is to be effectual the milk must not only be heated up to a temperature of 155° F., but must be maintained at this temperature for twenty minutes. Bitter has invented an apparatus for efficient pasteurisation, in which the milk is kept at a temperature of from 158-160° for thirty minutes, after which it is rapidly cooled. He gives the following results of the bacteriological examination of five samples, before and after pasteurisation: No. 1, before pasteurisation, had an average of 102,600 bacteria in every ten drops, but only two to three after the process was completed; No. 2 had 251,600 before, and thirty to forty after; No. 3 had 25,000 before, and three to five after; No. 4 had 37,500 before, and two to five after; whilst No. 5 had 94,000 before, and only two after. These figures have been confirmed by Freudenreich of Berne.

A SIMPLE APPARATUS FOR HOUSEHOLD USE.

A very simple apparatus is sufficient for household use, the essential parts being: An easily cleansed bottle with a cotton wool plug, to contain the milk; a metal vessel provided with a wire stand at the bottom to support the bottle; and a thermometer, the stem of which passes through the lid of the outer vessel so that the temperature can be ascertained without the cover being removed. The temperature of the water should be slowly raised to 160° F., after which the vessel should be taken off the fire, and should be kept for thirty minutes under a thick cosy. At the end of this period the bottle should be taken out of the water, and put in a cool place so that the temperature of the milk may be lowered as rapidly as possible.

STERILIZATION.

A large number of special appliances have been invented for the sterilization of milk. They may be divided into two classes: Those that are arranged for dealing with the milk in bulk, and those that are adapted for dealing with small quantities of it in bottles. As regards the former the most effective, and at the same time the most economical forms of apparatus are those in which the milk is treated with steam under pressure, the storage vessels being filled and closed in such a way as to make it impossible for any micro-organisms to get in during the process.

In the second type of sterilizer, the milk is placed in feeding bottles, which are immersed, as in Soxhlet's apparatus, in water, or around which steam is passed, as in the apparatus used in the Walker-Gordon milk laboratory of Boston. The disadvantage of this method is, that the cream tends to rise and to adhere to the necks of the bottles, so that a certain proportion of it is left behind after the child has finished its meal.

Advantages and Disadvantages of Sterilized Milk.

I will now proceed to consider the relative advantages and disadvantages of raw, pasteurised, and so-called sterilized milk; complete artificial sterilization, as shown above, being impracticable.

RAW MILK.

The advantages of raw milk are the following: the fat contained in it is in a more perfectly emulsified condition, it is more pleasant to the taste, the free and combined carbonic acid (7.5 per cent. and 2.2 per cent. respectively) not having been driven off, the phosphorus and lime salts remain in their normal condition, and, finally, its casein is more digestible than that of milk, which has been heated to 212° F. The great disadvantage of the use of raw milk in England is, that with our present system of control and management of dairies, it is impossible to insure against the milk becoming contaminated with large numbers of misro-organisms, some of which may be pathogenic. If we had dairies, such as those of the Milk Supply Company of Copenhagen, and the Walker-Gordon milk laboratories of Boston, where direct and efficient control is exercised, it would be worth while to dwell upon the very marked advantages possessed by raw milk for the feeding of infants. In order to render its use safe, however, the cow must be treated with the same care and consideration as a human wet nurse.

STERILIZED MILK.

It would be well if similar, though somewhat less rigid precautions were to be taken with milk, which is to be sterilized or pasteurised, for it cannot be too strongly insisted upon, that foul milk cannot be rendered wholesome by any amount of household boiling. Dr. Ashby remarks on this point: "You may certainly destroy most, if not all, tubercle or enteric bacilli, but many of the most noxious saprophytic bacteria, their spores, and toxins, resist the boiling point. No amount of boiling can render bad milk good or fit for the food of infants." It is very much easier to sterilize clean milk at a comparatively low temperature than milk which swarms with bacteria at a much higher one. Unfortunately it is necessary for us to consider not only the best means of dealing with milk such as we have it, but with milk such as we get it. This in most cases is rich in bacteria.

Undoubtedly the chief advantage of sterilizing milk is, that all the pathogenic, the majority of the non-pathogenic, and the adult forms of even those bacteria, which have especially resistent spores, are thereby destroyed. In my opinion, this advantage far outweighs any disadvantages that there may be to the process. However, prepare cow's milk as we may, we cannot shut our eyes to the fact that it is out of the question to anticipate such good results in the majority of cases, from artificial as from breast feeding. Further, Laves has shown that the fat of cow's milk is quite different in composition from that of human milk. Thus we see that human milk differs from cow's milk, not only in the percentage quantity of its ingredients, but also in the molecular composition of these ingredients; hence we must not blame the process of sterilization for defects, which are inherent in the cow's milk itself.

The Disadvantages of Sterilization.

Undoubtedly the chief objection to sterilized milk is, that its casein is less digestible than that of unsterilized milk. In the artificial digestion of diluted milk rich in cream, I found that the casein of the unsterilized milk was digested in about half the time required by the casein of the sterilized milk. Further, there is a difference in the action of rennet, the coagulum in the one case being quite different from that in the other. This is partly due to the precipitation of calcium salts, but not entirely, for if we add hydrochloric acid, and thus re-dissolve these salts, we find that the coagula are still different. This relative indigestibility of the casein of sterilized milk is of the greatest importance, for in most cases it renders it necessary that the intervals between the meals should be longer for infants fed upon sterilized than upon unsterilized milk. Indeed, where there is a certain amount of gastric atony, the infant may be unable to take a sufficient quantity of milk for the purpose of nourishment, and thus may undergo a process of slow starvation.

The experience of cases such as these has given rise to the belief that rickets, and especially scurvy rickets, may be induced by the use of sterilized milk. This is true, I believe, but the cause of these diseases is that the child has been receiving insufficient food, and especially an insufficiency of carbo-hydrates and fats, rather than that there is a "subtle change" in the milk as the result of sterilization. Randolph, of Philadelphia, conducted a series of experiments upon adults, and found that the raw milk had in every case been digested more rapidly than the boiled.

A second, though less important objection, is the fact that the taste and smell of the milk are altered, and although this rarely matters in the case of young infants, it sometimes causes difficulty with older children.

Another disadvantage is, that the greater part of the carbonic acid gas in the milk is driven off, thus inducing an alteration in the composition of the phosphates, and a precipitation of calcium and magnesium carbonates.

Fourthly, some of the fat globules coalesce, the result being that the emulsification is not quite so perfect as in raw milk.

Fifthly, the lact-albumen is coagulated and gives rise to the albuminous skin which forms upon the surface as the milk cools, even if it has not been boiled, and contains entangled in its meshes a considerable quantity of fat, thus rendering the milk correspondingly poor in this most important ingredient.

Sixthly, any leucocytes that may be present in the milk are killed during sterilization; however, as at present we know so little about the *role* of leucocytes in milk, we are unable to state whether this is a disadvantage or not.

PASTEURISED MILK.

On the following grounds pasteurised milk is to be preferred to sterilized milk:

First, the digestibility of the casein is only diminished to a slight extent.

Secondly, the taste and smell of the milk are not permanently altered.

Thirdly, less carbon dioxide is driven off.

Fourthly, the condition of the fat remains practically unchanged.

Fifthly, the lact-albumen is not coagulated.

Of late great attention has been devoted to the subject of the adaptation of cow's milk to the needs of the human infant. I would like to draw attention to the excellent results which have been obtained by the use of Dr. Gaetner's fat milk in various parts of Austria and Germany. Dr. Pollak, in Vienna, writes me that its use has been attended with the best results in cases of rickets. Its mode of preparation is as follows: Dilute the milk with an equal quantity of sterile water in order to halve the amount of casein; centrifugalize the mixture at a temperature of 35° C., and allow the creamy portion of the milk to flow direct into a cooling chamber, where its temperature is reduced to 15° C. The fat milk so obtained contains only half the proteids and milk sugar, but all but 2 per cent. of the fat of the original milk. It is then sterilized in a Popp-Becker sterilizer at a temperature of 102° C. after which it is rapidly cooled down to a temperature of 18° C.; 35 grammes of milk sugar should be added to each litre of the fat milk.

MODE OF PREPARING FAT MILK.

Gaertner's fat milk appears to be as well adapted to the needs of infants as Frankland's humanized milk, whilst its mode of preparation is much simpler. For household purposes the method recommended by Dr. Ashby is both simple and effective. The fresh, clean milk is allowed to stand in the 30 oz. sterilized bottle of a pasteurising apparatus for two hours, during which time the greater part of the cream rises to the surface; the lower half is then syphoned off and replaced by boiled water, in which an apothecary's ounce of milk sugar has been dissolved. In my opinion in most cases it is better to replace the milk, which has been siphoned off, by thin barley water. Experimentally I have found that, when barley water is mixed with milk, the curd formed during artificial digestion is more granular than that formed in the mixture of milk and plain water. I have had the barley water of the consistency that I recommend analyzed; the total solid matters only amount to 1.23 per cent., being made up of 0.117 per cent. albuminoids, 1.078 starch dextrin, etc., and 0.035 per cent. of mineral matters. The small quantity of starch is of no great importance, especially when we take into account the fact recently pointed out by Heubner and Zweifel, namely, that the salivary glands of the infant are functional at a much earlier age than was previously thought. It is well also, as Jacobi has suggested, to add a small quantity of common salt to the prepared milk, as there is less of this important food constituent in cow's than in human milk; in the former only 13.5 per cent. of the ash consists of chlorine, whilst in the latter the proportion is 20.11 per cent.

The plan adopted in the Walker-Gordon and other milk laboratories in America of modifying the milk according to the physician's prescription is one that might be followed with great advantage in certain cases.

Finally, I would like to point out that one source of great danger in the artificial feeding of infants is the idea so firmly rooted in the public mind, that the strength of the milk given should be rapidly increased. Analyses of human milk at different periods of lactation show that its percentage composition does not vary to any great extent, the chief difference being in the quantity secreted. The percentage strength of the cow's milk should only be increased with the greatest caution.

THE QUIXOTIC WAR ON MICROBES.

THE grand army of medical men, pseudo-scientists, has been on the rampage against "microbes," as enemies to the health of the community for some years past, and doubtless this war will continue for an indefinite period, notwithstanding the experiments of the Russian physician and philosopher who has clearly demonstrated the hygienic value of "germs" in assisting the body in the performance of its functions. He fed animals on food that had been carefully sterilized, says the *American Practitioner and News*, and compelled them to breathe germless air. The experiment proved that the presence of microbes is essential to digestion. The animals soon showed the effect of the deprivation. First they began to droop, then lost their appetite, and finally weakened and died. It was found that the food supply would not assimilate when the microbes were absent. This series of experimentation has been extended to the vegetable world. It is now proved that certain plants can only assimilate the nitrogen which is necessary to their growth through the action of the microbes that live at their roots. Ninety-nine in the hundred physicians have been for years past advocating the use of sterilized milk for bottle-fed babes and all sick and ailing people. It has been the writer's maxim all along that milk is a bad food, and a worse drink, that it is not a natural product in these days of "driving" cows for immense yields. Cows are overfed and under-exercised, as we know, and therefore there are none of them in high health; far from that, they are found to be suffering from tuberculosis very generally, and the milk from such cows cannot be regarded as wholesome. Natural milk is the product of cows that earn their own living in the free open air, and at that the yield is as small as the quality is perfect, and it is designed to furnish the calf his sustenance for a few months, and then it is no longer produced. So much for the matter of "natural milk" as a food. As a drink for human beings, there is little to be said in its favor, as nurslings of every kind take their natural food in driblets, so that it goes to the stomach in tiny doses instead of being cascaded into this organ. Doubtless milk is best raw and should be sipped always instead of being drunk. It is perhaps altogether safe to say that every kind of food substance that is agreeable in its raw or natural state, is better for the nourishment of human beings without being changed by cooking. It is living not dead food; it has all its natural "germs" or "microbes" alive and in condition to perform their health-giving functions.

This is one reason why the natural foods, such as all the varieties of nuts, sweet fruits, as dates, figs, etc., as well as oranges, peaches, apples, etc., constitute a diet perfectly fitted for human beings, and in value as far beyond the ordinary mixed diet of the people in wholesomeness, as fresh, soft spring water is better than boiled pool water for drinking purposes. Doubtless there are stomachs so enfeebled by life-long use of hot, cooked food, that the free and unrestricted use of nuts would at first disturb the experimenter, but within the past few years many thousands of persons have been led to adopt the "natural diet," and the evidence is greatly in its favor as the most wholesome as well as the most toothsome diet.

THE NEW FOODS.

MUCH discussion has arisen since M. Berthelot, the former French minister of war and eminent chemist, lately announced his confidence that in the not very distant future we should be able to live on artificial food, that our mutton and beef of to-day would be superfluous, and that its synthetical substitute in a much more convenient form would be provided by the laboratory instead of the kitchen; that the vagaries and little weaknesses of the vast army of chefs, male and female, would have to surrender to the definite methods of the trained and accomplished chemist. If M. Berthelot is to be relied upon, the day when we shall be able to store the active principle, or its artificial substitute, of a bullock in a pill-box is dawning. Whether it will meet with popular sympathy is a question. Our old prejudices will die hard.

Professor Berthelot is credited with saying that gourmets and epicures may mourn, but he feels assured when they have grown accustomed to the change they will eat nothing prepared in any other way. Tea, coffee, and sugar are weaklings in the chemist's hands and are to be turned out just when wanted at a price which should prove ruinous to the industries they at present represent. Berthelot says: "The essential principle of both tea and coffee is the same. The difference of name between thein and caffein has arisen from the sources from which they were obtained. They are chemically identical in constitution, and their essence has often been made synthetically. The penultimate stage in the synthesis is theo-bromine, the essential principle of cocoa. Thus, it may be seen that synthetic chemistry is ready to furnish from its laboratories the three great non-alcoholic beverages in general use. And what is true of food substances is equally applicable to all other organic substances."

◆

We are indebted to the bacteriologists for many things but they have taught us nothing of more practical value than the lesson that a large number of our minor complaints and a thousand-and-one of our aches and pains, which make life miserable, come from auto-intoxication. The ever present germs in the alimentary tract manufacture their toxines and these are absorbed, much to the distress, if not to actual danger, of the individual. The good old-fashioned theory that you must "keep the bowels open" if you wish to enjoy perfect health thus finds a scientific explanation in these latter days. It is now simply a question of common sense; keep the alimentary canal free from the poisons of germ life. You cannot do this better than by using California Fig Syrup. It is pleasant to the palate, and prompt to give relief.

THE
DIETETIC AND HYGIENIC GAZETTE
A·MONTHLY·JOURNAL OF PHYSIOLOGICAL·MEDICINE

VOL. XII. NEW YORK, NOVEMBER, 1896. No. ~~12~~ 11

HOME SURROUNDINGS AND THEIR RELATIONS TO HEALTH.

BY J. HOBART EGBERT, A. M., M.D., PH. D.

Holyoke, Mass.

THE home is the primal factor of towns, cities, nations—in fact, of all places where the human family exist. It is the very birthplace of civilization, as the centre of its perpetuation, and governs in large measure the moral, mental and physical condition of mankind. Its influence upon health is both certain and direct. The damp dwelling produces the rheumatic, the asthmatic, and the consumptive: while the poorly lighted and poorly ventilated dwelling sends forth its scrofulous, anæmic, near-sighted and debilitated offspring. The natural surroundings and sanitary conditions of the home affect all the inmates from the infant in the cradle to the aged grandsire whose white locks and bended form seldom grace the home where the general surroundings are bad, in a sanitary and hygienic sense. Too much stress cannot be put upon the necessity for healthy homes. Make the homes right and all edifices where men, women and children congregate will partake of healthful influence for, when mankind shall fully comprehend the necessity for herlthy homes and shall diligently seek to understand the conditions of their construction and maintenance, the proper sanitary arrangements of factories, school-houses, churches, halls, stores, counting-houses, hotels and all public buildings will be appreciated and applied.

The surroundings are to the home what the sea and the wind are to the ship. They are essential factors in all its appointments and embrace the atmosphere, the scenery, and all adjacent land and structures no less than the very site itself.

In the choice of a building site or in the selection of a house already erected, the nature of the soil, the proximity of marshes, ponds, sluggish streams, and of factories, stables, barn-yards, and even other dwellings are to be considered. The nature of the soil upon which a house is built and of the adjoining land is a matter of much importance. Soil carries both air and water and contains a variety of solid matters, and it is necessary to know that the ground air is sufficiently pure, that the ground water is at a sufficient depth below the surface and that the earth is not filled with decomposing organic debris. Ground air can hardly be kept out of houses, for the warmer air within draws up the cooler air from the soil and thus foul air from cesspools and leaky drains and the unwholsome emanations from decaying material within and upon the soil may be conveyed directly into houses to be breathed by their inmates. To this end, all "made land" is to be avoided. Land is usually "made" by filling in a bog or other low place with ashes, cinders, the sweepings from streets, refuse from houses, and other garbage freighted with decomposed and decomposing animal and vegetable matter,—the foul gases from which make their way upward into the air, and nothing that man can do will prevent them from penetrating into a house built upon such ground and poisoning the air of kitchen and parlor, of dining-room and bed-chamber. Not a few of the most palatial residences in our cities are from this cause as unhealthy as the fever-ward of a hospital. Even if the filling-in is of the clean ashes and wholesome earth, time must elapse before the site is fit for a dwelling-house. No structure designed for human habitation should be begun upon even the best "made land" within less than two years after the filling-in has been completed.

The amount of water in and upon the soil must receive serious attention. It is well-known that a damp soil is unfavorable to health. General Viele has averred that water in the soil in places inhabited by man is the greatest of all foes to his life and health. In choosing a site for a home it is absolutely necessary that the ground be so situated and the soil of such a character that thorough drainage can be effected. An elevated rather than a low site should therefore be chosen. Moreover, places where subterraneous water courses exist and where there is a natural basin for receiving water shed from higher ground are to be avoided.

In many cases the land to be occupied will require deep drainage in order to maintain a low water level in the ground and secure proper ventilation of the soil. Water may reach the site by falling upon it as rain or snow, by flowing overland, or by percolation underground, and the manner and extent of drainage requirements are affected by the permeability of the soil, the slope of the surface, the proximity and character of higher ground, the position and course of the water, and the proper place for its discharge. One cardinal principle of land drainage is to intercept the water as early and as near its source as possible. Thus a single drain can often be made to do the work of many, while the sooner the water is drained off, the less it gets into the soil and the less harm it does.

Subsoil drains should be about fifteen feet below the surface, and may consist of small round or rectangular unmortared culverts of stone or brick, pipes of terra-cotta, akron or cement. In any case they must be open at the joints, or elsewhere, to receive the water; be surrounded by coarse gravel or cracked stone, to exclude the earth or silt; while a vertical stratum of gravel should extend from the drain to the surface of the ground. Without this latter precaution drains may cease to take off water from the soil some feet above them, after the filling over them becomes consolidated. There can be no doubt about the great benefit to be derived from subsoil drainage, unless the ground is already dry. Many houses already built may be made much dryer and healthier by deep drainage about them; while others, where the ground is clayey or hard, can be greatly benefited by a substitution, here and there of gravel and sand through the natural soil. A soil of sand, gravel or loose limestone offers the best natural drainage, retains the least amount of alluvial deposits and maintains the lowest water level, and hence is, in a sanitary sense, the best for the location of dwellings.

Cellars must be kept dry, for if the cellar is damp the whole house will be damp. Where possible water should not be drained out of a cellar but kept from getting in, and it should not be dried but kept from getting wet.

The near vicinity of streams, ponds, or other small bodies of water is always to be regarded with suspicion. The water itself may be advantageous in many ways and may not endanger health if neither stagnant nor loaded with impurities. A stagnant pool in the neighborhood of a house should be drained or the house deserted. The danger to health from streams and ponds not stagnant arises principally from two causes. One is the decaying organic matter coming from the various drains, swamps, and other undesirable sources that swell the volume of the water, and from impurities that reach the main stream or pond. The other cause is the occasional overflow of the water upon its banks and its subsequent recession. There is considerable organic matter in the mud at the bottom of nearly every pond and large stream. This matter can do little or no harm while covered by running water but, on the contrary, is useful in affording food for fishes and plants, by which means it is gradually removed. If, however, the water recedes and leaves this mud exposed to the warm rays of the sun, decomposition of its organic matter rapidly takes place and the noxious particles, instead of furnishing useful food for plants or fishes float out into the air to poison human beings.

The growth of vegetation outside of a house is usually favorable to health, but, the decay of vegetation is exceedingly detrimental to health. It is very important to remove from the neighborhood of dwellings all accumulations of fallen leaves rank growths of grass, and the like, before they have time to decay. A few trees about a house are desirable, but too many are an injury. They should be placed at a sufficient distance as not to affect it with their moisture, and should be so arranged as to allow both air and light free access to its exterior.

The discharge of waste from the house may be into or upon the surrounding land and hence, in country and village homes at least, the matter of the disposal of house refuse may materially affect the healthfulness of the home surroundings. In cities with public water supplies and sewerage systems, where these matters are arranged and controlled by Health Boards and proper officials, varying conditions of land and circumstances render necessary an elaboration of construction and arrangement, the details of which need not now occupy us; but the involved principals are always the same, to wit: to have a liberal supply of pure, wholesome drinking water; to prevent pollution of the air and soil, and to carry all noxious waste matters safely out of the reach of human beings. In sparsely populated districts a drain may convey house refuse to a safe distance from the dwelling and discharge it upon the ground or into a running stream; but in towns or villages where there is no adequate sewerage system, the householder frequently finds his own lot too small for surface disposal and too near his neighbors' for using a brook or stream, even where the latter is at hand. In such event neighbors should unite and, acting either by themselves or municipal organizations, establish a system of house and land drainage which will carry house refuse to a sufficient distance from habitable dwellings and discharge it into a large flowing stream, or better, supply it to the soil of outlying districts as pabulum for vegetable life. Regardless of the means instituted for collecting and conveying human waste and other effete organic material, they should, as soon and as conveniently as possible, be exposed to the benign action of Nature's potent disinfectants,—dry earth, circulating air, and growing plants. Working together these purifiers are perfect in action and for the purpose under consideration yield the best possible results. Let sewage pass through, or flow over—not lie stagnant upon—the upper layers of any soil not already saturated with water, and through the Chemistry of Nature there takes place a change which results in universal benefit. In this country sewage irrigation is rapidly gaining in favor and the dry lands of the West are being made fertile and abundantly productive. The famous Craigentinny Meadows, near Edinburgh, Scotland, derive their luxuriance from sewage irrigation; while at Clichy, France, five thousand acres of barren sand were, by the sewage of Paris, converted into fertile fields and gardens. Among the Alpes Maritimes, ground fertilized chiefly with the waste of human habitations produces, for the uses of perfumers, an abundance of roses and violets

When no better means are available, a cesspool may be tolerated. Cesspools, even if sometimes necessary, are bad things, for they load the ground air with poisons and saturate the subsoil with fluids containing decaying organic material; but, if not too near dwellings and if properly constructed, they are better than the slimy pools in the grass at the end of open drains and within sight and scent of kitchen windows, which mark the only vent for the waste water of far too many houses. Where a cesspool is the only practical resort, it should, at least, be well constructed and placed as far as possible from dwellings, wells, rain-water cisterns, and all water supplies. Its walls should be of brick or stone, and these, as well as the top, should be lined with cement, or in some other way made quite impervious to water and gas; every drain or waste pipe entering it should be provided with an efficient trap, and it should be ventilated from the top. If this latter precaution is neglected, the gas not only becomes more dangerous by concentration, but may be formed in sufficient quantities to displace, by pressure, the water in the trap and flow through the waste pipe into the house. It should always be remembered that no cesspool is to be made or tolerated except in soil that is naturally dry and porous to a requisite depth.

Cottage privies, if allowed at all, should be well removed from dwellings and all water supplies, and should communicate with the houses by dry walks or paths. They are, however, unnecessary and undesirable and water-closets should be substituted, where a sufficient water supply is at hand, and when this is not available, the earth-closet should by all means be given preference. This latter may be connected directly with the house, and, if properly conducted, cannot give offense.

Frequently the water supply belongs to the surroundings of the home, and, if so, may prove a constant menace to the life and health of the inmates. Wells are quite likely to be contaminated by organic poisons from cesspools, drains, barn-yards, decaying animal and vegetable remains in and upon the surface of the soil, etc. Rain-water, collected in properly constructed rain-water cisterns, is less likely to be thus contaminated, while springs furnish a fresh and never-failing supply of pure, wholesome water.

In the interest of universal health let dwellings be placed at a safe or, at least, respectable distance from barn-yards, poultry-yards, pig-pens, cesspools, privies, gas manufactories, soap-boiling establishments, slaughter-houses, grave-yards, *et omnis cetera*, and, where possible, let them have sufficient space on all sides to insure a proper circulation of air about them and the free access of the sun's rays. A free open space on at least two sides is imperative. Spacious lawns, well-kept flower-gardens, and wide, paved drives and walks are of value to any home, lending cheer to the aspect and adding a large share of health-giving influence.

For the invalid who seeks a home with a view to benefiting some particular disorder, special care in the choice of a location is necessary. Those with chronic lung and throat troubles will do well to locate inland on elevated ground in the country where pines abound, and where the air is dry and free from dust and noxious gases. Those afflicted with malaria should get far from large water-courses and low and swampy grounds. The rheumatic should seek a warm, dry climate, preferably under a southern sun; while those suffering from mental disorders will usually find rest and benefit on some quiet island of the sea. For men whose bodies are weakened by careless habits or overwork, and for those whose minds are wearied by the long-borne cares of business life, nothing is more refreshing nor acts with more vigorous restorative effect than a temporary residence in the Maine woods, or other secluded spot, during the trouting or hunting season. Under such surroundings, wrinkles disappear from the brow, lustre is restored to the eyes, and flesh to the bones, while digestive processes—if the appetite may be taken as a certain indication—reach a maximum of activity.

A SIMILARITY BETWEEN MALARIA AND CONSUMPTION.

By W. Mazyck Memminger, M. D.

This article is written with the hope that it may attract the attention of thinking men and lead to some discovery which may be of value to the many sufferers from consumption. After having engaged in private practice for several years at the North, I myself, acquired consumption, having had frequent hemorrhages, progressive emaciation and the tubercle bacillus constantly present in my sputum. Finding myself incapacitated for work, I removed first to Sewanee, Tenn., and after a short stay there to Summerville, S. C. Here I have improved most wonderfully; so much so that I have every reason to believe that I will soon have completely recovered. I find here that complete recovery is the rule, that consumptives who have an opportunity of residing here have no dread of the disease, as they know that it will soon be eradicated and they will again regain their natural state of health. Hundreds who have come here from the neighboring towns and cities with this dread disease can give a history of entire recovery without any special form of medication, and many of these after great destruction of a lung had occurred. These strange facts make the peculiarities of this place worthy of note. Summerville is situated right in the midst of a deadly malarial country, and although the place is not more than two miles in diameter the inhabitants are entirely free from malarial fever. Any one spending even one night during the summer months outside of this limit greatly endangers his life. The place can scarcely be called a town as the houses are scattered about in the woods. There being a law against cutting down the trees, the inhabitants considering their freedom from fever due to the pine trees, a large number of which are found here. This I cannot think is the case for there are many pine forests in this section of the country which are highly malarial. The surrounding country is also infested during the summer months with mosquitoes; here in this little spot there are scarcely any. The climate is mild and equable, not very hot in summer as there are constantly refreshing breezes, and not cold in winter. The altitude is low, being very little above the sea level. The soil is porous and sandy, but the sand is heavy so that there is no dust in the atmosphere even in extremely dry weather. The air is balmy and soft, none of the harshness of the sea coast and is impregnated with the refreshing odor of the pines. The fact which is here made evident, and the one to which I wish to call special attention is this, that the same influence which is destructive to the malarial parasite is evidently one which is also destructive to the tubercle bacillus.

Cold weather will destroy malaria, it will not tuberculosis. Quinia destroys malaria, it does not tuberculosis. As none of these known agents are here necessary for the destruction of the deadly malarial miasm, which must be constantly wafted over this oasis in the midst of it, it is evident that there must be some other and yet unknown agent at work. Let us hope that it may soon be discovered so that it may be used throughout the entire world, for Summerville is not large enough to hold many tubercular sufferers. Another condition which is here observed is that it requires some time to destroy the tubercle bacillus in the individual, just as is the case with the malarial parasite. A malarial patient being subjected to non-malarial influences will not be entirely free from the disease (excepting, of course, where a specific in concentrated doses, like quinine, is being given), for perhaps several years; so it is with consumptives here, the disease cannot be destroyed by short stays; the patients must reside here winter and summer for a few years; if they will do this they will thoroughly eradicate the disease. They may then return to their homes, and unless they become reinfected will enjoy perfect health. If the destructive agent which is here present could be detected and isolated we could perhaps give it in concentrated forms and so bring about recoveries more rapidly, as we are able to do in the case of malarial fevers by means of quinine. Many authors have noticed a peculiar predisposition to pulmonary complications in malarial fevers and that these complications most usually affect some local region, especially the apices of the lungs, the same region most commonly affected by the tubercle bacillus.

The fever of the two diseases in their chronic forms act to a certain extent alike, being almost continuous, with occasional exacerbations. The parasitic origin of the two diseases is recognized to be dissimilar, but as the parasites of the several varieties of malarial affections seem to differ and their exact nature is still masked to a certain extent in doubt, some forms, and particularly those which appear to be the most virulent, responding readily to quinine where as in others this drug is almost inert; there is a possibility that the tubercle bacillus may be of a similar type. Malarial infection we find diffused to a greater or less extent throughout almost our entire country, in like manner do we find consumption. In low damp regions both diseases are more common and virulent, whereas in high mountainous and dry regions such as Colorado, both diseases are rare, and those affected are often cured. In the southern States of our country where the malarial infection is of a malignant character, the disease occurs in such decided types that it is treated actively, and we do not have tuberculosis as commonly as at the North where the malarial infection is of a mild, subtle and unrecognizable character. Among our lower and ignorant classes in the South, however, which neglect malarial conditions, the mortality from consumption is very great. I am told that this is also the case in Cuba. An illness, any depleting influence, exposure to rain, etc., in a decidedly malarial country result in malarial fever, acute or chronic; the same conditions in what are supposed not to be malarial regions most usually results in a gradual decline of health and consumption. The special feature of similarity which should attract our attention is that this natural agent which is here in Summerville destructive to these two diseases, malarial fever and consumption is not destructive to other diseases, for most of them have been acquired here and run their typical courses. The fact that these two diseases respond to the same treatment should lead us to suppose them to be alike, or that as they have different appearances and symptoms that they are produced by different varieties of the same parasite. Among plants and animals we are thoroughly familiar with the decidedly different appearances and habits of the many varieties of the same species, and that certain agents are destructive to one variety which is perfectly harmless to another, consequently having under our observation many regions which are destructive to the malarial miasm and a few which are destructive to tubercle bacillus, it alone remains for us to search for the agent which is at work in these localities.

FRUIT AS FOOD.

By Arthur R. Elliot, M. D.

Professor of Preventive Medicine and Urinary Diagnosis at The Post Graduate Medical School, Chicago.

There is no doubt that the palate is in the main a good guide to be followed in the selection of our food and can in the majority of instances be depended upon as a reliable dietetic mentor. While its sensitiveness is partly acquired it is also very largely an inherited faculty, the accumulated experience of generations of dietetic lessons. Like other instincts it is not infallible but the sympathy between it and the stomach is so intimate that its promptings are entitled to the utmost consideration. Each branch of the animal kingdom has its own food standard regulated by the needs of the system and with due regard to the capabilities of the digestive organs. These find active expression in the palate which, acting in accordance with the precepts of nature guides the animal safely in the selection of its proper food. "Sweets are distasteful to the carnivora, meats to the herbivora,' because such food not being suited to their respective needs do not appeal to their palates. Can we do less than accord to this instinct in man the highest member of animate creation, less virtue, less weight? Palatal relish is within bounds but a modification of hunger and the value of hunger is seldom appreciated. It is the warder, the task-master of the body, seldom erring, ever recurring and persistent until appeased. It is the appeal of the system for food to replace the material consumed in the production of the energy and animal heat necessary to the proper performance of the vital functions.

Until comparatively recently fruits have occupied no very considerable place in the national dietary. It is only within a few years that they, the luxuries of our fathers, have by reason of improved methods of culture and storage been placed within the easy reach of all and from being available only to the wealthy have become a necessary part of the people's food. It is not entirely to satisfy the cravings of the appetite that this is so. Nature has very lavishly made fruits the most attractive of our foods, appealing as they do by their beauty to the eye, by their subtle fragrance to the smell, and by their luscious, aromatic flavors to the taste. It cannot be possible that in contradiction of all we know of nature's workings, she has been thus bountiful without some wise purpose in view and what more likely that purpose than to tempt man to incorporate them prominently into his dietary. But she has not only made fruits beautiful, she has endowed them with nutritive qualities of no mean order. They do not rank high as tissue formers but they contain in attractive and concentrated form two elements, sugar and vegetable salts which are essential to life itself. Withdrawal of the last named from the food results in the gravest forms of malnutrition ending finally in scurvy. The increasingly important place which fruits are assuming in our diet needs no better explanation than to point to the marvelous manner in which a munificent nature has combined so much that is essential to our well-being with beauty and wholesomeness.

Civilized man has been dubbed "the cooking animal," being the only animal who so prepares his food. By cooking, our food is rendered easier of digestion and more readily available for our body needs. The articles still eaten in the raw state are comparatively few. Fruits are the most notable example. Except in rare cases of idiosyncrasy or weak digestion, they are well assimilated and healthful when taken in the uncooked state. To eat raw food may seem a survival of instinct from our savage forefathers. In this case, however, we have another example of the wisdom of nature's promptings. The sugar and fruit salts which are the nutritive principles of fruits are not changed by cooking so that nothing is gained in nutriment while much is lost in attractiveness and palatability by such preparation. Green, unripe fruit should, however, invariably be boiled before eating.

Our climatic conditions are such as to render a diversified diet peculiarly necessary. During the winter season fats and meats are demanded in larger quantity by the system to furnish heat to withstand the cold, and tissue to replace the increased waste going on under the stimulus of a lowered temperature. The heat of summer imposes other and quite different necessities as witness the distaste for fats and the instinctive cravings for fruits and vegetables. It has been said that "climate affects diet mainly by the supply it affords." In tropical and semi-tropical countries fruits and vegetables grow in rich profusion. It would, therefore, almost seem as if they were intended as man's natural hot-weather food. Whether this be true or not it cannot be doubted that they contain many of the elements best adapted to our needs during the summer months, most agreeably combined, and requiring the least expenditure of energy to utilize them. While fruits serve many excellent dietetic purposes they, however, cannot alone support nutrition unimpaired, a mixed diet being at all times necessary for the maintenance of the normal. Fruits are not all of equal nutritive value. The date, plantain, and its variety, the banana, rank highest in this respect, each containing sufficient nutriment to support life for a long period. The banana has assumed a very important place among fruits brought to this country. It is, unfortunately, necessary in shipping to the United States to pick the fruit while still green, and it is often but imperfectly ripened when eaten. This probably accounts for the fact that many persons cannot digest them. When well ripened and fresh no such difficulty is experienced. Flour made from the fruit is highly valued as an invalid food.

Apples, pears, peaches and apricots depend upon their sugar and organic salts for their usefulness. They possess decided laxative qualities, and are beneficial in combatting constipation and stimulating secretion.

Lemons, limes, and oranges contain abundant fruit acids and salts, and on this account are famous as anti-scorbutics. The succulent pineapple is wholesome and possesses a ferment having marked digestant powers.

The much-eaten grape is so largely composed of water as to contain but little nutriment. Still they hold considerable sugar and salts which are useful to the system. The unfermented juice constitutes an agreeable slightly laxative non-alcoholic beverage which is constantly growing in favor. The practice, unfortunately quite common, of swallowing the seeds of the fruit cannot be too strongly condemned. They serve no good purpose, not being acted upon by the digestive fluids and passing through the bowels unchanged act only as irritants and foreign bodies. They are liable to cause diarrhœa, obstruction and. more rarely, appendicitis. Olives as eaten in this country are strong stimulants to digestion and are useful for the oil they contain. Figs have a decided aperient action probably due principally to their seeds.

Fruits are most wholesome when fresh. Eaten out of season they are much less so.

The real reason why many people cannot digest fruits is because they do not eat them at proper times. The poorest time is at the completion of a meal when they dilute the gastric juices and tend to embarrass digestion. They should be eaten either at the commencement of a meal or between meals. They will then by virtue of the organic acids they contain assist in digestion of the food, and will exert to the utmost their laxative effects. Swallowing the skins is a useless and harmful custom.

In conclusion, a few of the uses of fruits may be summarized as follows:

I. To furnish variety to the diet.

II. To relieve thirst and introduce water into the system.

III. To furnish nutriment.

IV. To supply organic salts essential to proper nutrition.

V. To stimulate the kidneys, increase the flow of urine, and lower its acidity.

VI. To act as laxatives.

VII. To stimulate and improve appetite and digestion.

VIII. To act as anti-scorbutics.

LYCOPERSICUM CARDIOPATHIA.*

By W. T. English, A.M., M.D.

Professor of Physical Diagnosis in Medical Department of Western University of Pennsylvania and Consultant in Chest Diseases in the South Side Hospital, Pittsburgh, Pa.

The *Lycopersicum esculentum*, natural order of *Solanaceae*, indigenous to South America, is a vining plant with irregular sessated leaves, bearing fruit of various shapes and colors. It is also known as the "love apple," but more commonly is called the "tomato." It was introduced into America in the latter part of the sixteenth century as an ornamental natural curiosity, and was found only in the conservatories of the wealthy. On account of its peculiar beauty it was subsequently taken to Europe. The fruit was considered poisonous to the human, but was observed to be eaten by lower animals. This fact excited Yankee curiosity and it was tested and adopted as an article of diet in some sections of America. It was not until the beginning of the civil war that its acceptance as an edible food became general. Europe has not up to the present given it general welcome as a food. Its principle utility is that of a relish and an agreeable addition to sauces. However, some people regard it as a wholesome and desirable acquisition to the list of foods. Because of its low nutritive value it does not merit a place with substantive aliment. Analyses have placed it among the vegetables consisting of over 85 per cent. water. According to Chambers and other writers on dietetics it is a diluent and not a food. The fluid element has been found to consist of an acid, called by some *acidum lycopersicum.* Others have claimed the acids to be acetic and malic in combination.

Notwithstanding the almost universal indulgence in this fruit there is a certain proportion on whom it acts as a poison. In some the symptoms are gradually developed; in others they become immediately alarming. Some cases show no immediate evidences, but the results are cumulative. Once the abnormalities appear they are liable to continue to increase as long as the fruit is ingested. Even in those, who for a time abstain, it is observed that the hiatus in the symptoms does not diminish susceptibility, but that the organ influenced retains it in the same degree as when the habit was omitted; and, that, despite apparently normal findings, it is proven that there is engendered an abnormal hypersensitive condition in the heart and circulatory apparatus; and if the toxic effects are once experienced they are more easily excited thereafter.

---

*Read in the Section on Practice of Medicine at the Forty-seventh Annual Meeting of the American Medical Association, at Atlanta, Ga., May 5-8, 1896.

First it appears as a simple cardiac irritability, but persisted in, it assumes the character of a latent endocarditis, and endoarteritis favoring the deposition of the products of inflammation throughout the circulatory apparatus, but more especially about the aortic roots and valves. The circulatory tubes, as well as the central organ, contribute to the concomitant faulty functionation so that perturbation of circulation and organic changes constitute the zenith point appropriately denominated *lycopersicum cardiopathia.* It is in the direction of the heart and circulation that the tomato habit exerts its ill effects. In early stages, in most cases, little abnormality can be found, but the apparent relation of cause to effect is empirically determined. The heart passes out of the condition of equilibrium into a habit of irregularity and inequality of rhythm and force. Dyspnea supervenes, limiting the capacity for exertion. Age and sex are influential factors. Adolescence and puberty with their new obligations make these periods especially liable. Heart development adds a new impetus to the irritation. The aged with the circulatory apparatus already upon the verge of change readily receive the initiative thus extended. Women during pregnancy and also at their menopause are often among those who exhibit the most severe and immediate results. In many maladies there is a peculiar pathology belonging to the rich man because of excesses, and on account of poverty and self-denial the poor man has his peculiar ills, but the tomato cachexia fastens itself upon each with the same hostile grasp.

Doubtless many cases of the tomato heart occur among those who are susceptible to a marked degree, and this sensitive condition permits the disturbance to augment in geometric rather than in arithmetic ratio. This predisposition aids in establishing a pathologic modality, which is readily observed to be a factor. But there is a growing sensitiveness noted at each succeeding alarm, until the body betrays its sympathy with the heart and circulation. But again there are those from whom the suffering line is very far removed and to whom even sentimental fears are distributed with extreme parsimony. These different neurosal types constitute the extremes in these cases.

Among the pathologic phenomena that appeal to us are the acidulous conditions of the stomach and the bodily fluids. With this state of the fluids there is a concomitant lowered alkalescence of the blood. The blood pressure is high because of the peripheral vasomotor contractions incident upon the variations in the blood of reduced alkalinity. The subendo-cardial ganglia also feel its influence directly applied to the sensitive endocardium. The ganglia in the muscular substance are brought into intimate relations with the blood through the medium of the coronary arteries and their branches and these are likewise perturbed.

High blood pressure excites the heart to vigorous action and causes a spastic rather than a paralytic condition. Myocardial weariness is induced and corresponds with the excitement as to degree and persistence. Because of the irregular and spasmodic stimulation of the ganglionic cells there is a gradual deterioration in nutrition, beginning primarily with the trophic nerves and extending its pernicious influence to the other nerve supplies materially damaging the cardiac enervation and begetting irregular action. At each succeeding paroxysm of palpitation there is noticed an increased inability to adjust the errors existing between blood pressure and heart action. Each paroxysm becomes easier of precipitation, and although the individual is more accustomed to the turbulence, the alarm and sensation are on the increase. The perfect functionation of the heart is held in abeyance by the continuous ingestion of the tomato, and the irritation becomes chronic. When long continued there are organic changes introduced, the tomato habit acting primarily as an irritant and later becoming an excitant to the already abnormally irritated organs. The left ventricle being more sensitive than the right, it is impelled to a premature attempt at systole, causing irregular rhythm, and this together with the overfilling of the capillary pulmonary circulation produces a prodromal asthma, which remains prodromal only so long as the heart maintains its unchanged structure.

Observations have been conducted over fifteen years and experience assures me that at least one-half of those who use them suffer more or less, while one-fourth are obviously injured. A small percentage exhibits all the evidence of acute poisoning.

The symptoms first noted are those of the immediate effects of the lycopersic acid upon the stomach and *prima via*. Pain and gastric uneasiness are succeeded by burning, choking, pyrosis and heartburn. These are succeeded by acid eructations with gaseous emanations from the stomach and, in some cases, vomiting.

Borborygma and active peristalsis are the enteric announcements, and these are speedily succeeded by stools of fermentative and offensive character. Eructations or expulsions of intestinal gases give temporary relief to the asthmatic oppressions which proves that mechanical distention has something to do with the symptom of dyspnea. The appetite is usually good until the onset of these symptoms, when the desire for food is supplanted by a craving for drink, which is the result of irritation, or congestion, of the gastric mucous surfaces. There are some cases in which these local symptoms are pronounced immediately after the ingestion of the fruit. The matter vomited is acid and of an odor betraying fermentative action. The excretions are acid, and the emunctories are usually very active.

Rapidly following the local phenomena pertaining to the digestive tract there is a rise in blood pressure proven by sphygmographic tracings. If the pressure is already high, it will be still higher. The tactile sense appreciates it in the apex beat and the pulse.

One of the most constant spmptoms of the tomato malady is the sighing respiration. The missing heart beat or the half executed circulatory cycle conveys to the patient the startling announcement that there is a serious and sudden arrest of vital activity within the thorax and it creates in the psychologic function as well as in the conceptions of the mind an uncomfortable surprise. The gap in the circulation is associated with a spasm of the respiratory function and a gasp for breath is the effort for relief. The patient's mental, moral and physical sympathy is aroused with as much earnestness as if he were receiving the immediate herald of impending death. Unlike the habitual mountain climber's heart and respiratory organs, the tomato habit observes no quietus from custom, but at each return the irritation seems to find more sensation and prompter response. If the paroxysmal palpitation reaches its typical acme, as in the very acute forms, the distress and anxiety are so pronounced that they approach all the terrors of true angina pectoris. Cold sweats appear upon the forehead and there is an imaginary intensity in the symptoms of bodily and heart fright, which steals over the patient's senses, that can not be measured by comparison with those which are real. The fluttering and fullness in the precordial region continue after the subsidence of the violence of the paroxysm, and are associated with cephalagia, supra-orbital tension and a constitutional languor. In acute cases speech is greatly impeded and articulation at times almost impossible though there is never complete aphasia., Together with this indistinct enunciation there is occasionally an incoherence of thought and several ideas seem to seek expression at the same time. Disturbed vision, floating objects in the visual mental apparitions, numbness of the fingers and tongue, and general perversion of the senses, constitute a part of the neurosal procession.

Some marked cases have been observed by me, which have presented a complete panorama of these symptoms within two hours after the ingestion of tomatoes. A number of patients are under my observation upon whom these symptoms can be reproduced within two or three hours after introducing into the stomach two ounces of tomato fruit. Immediately in some cases the irritation of the peripheral nerve terminations in the stomach produces a species of nervous cyclone, or a little nerve storm in the heart and its intrinsic ganglia. The symptoms which have arisen after the ingestion of tomatoes in the presence of preëxisting heart maladies have been deplorable, and have been introductory to, if not the immediate prodromata of death. In weakness of the respiratory muscles there will be corresponding augmentation of attending distress. In emaciated persons or those reduced by poverty or loss of blood the symptoms of palpitation are precipitated with alarming celerity. The use of tomatoes as an article of diet among pregnant women is followed by tumultuous demeanor of the heart, and where predisposition to abortion obtains may produce hapless results.

During the developmental period of the heart—especially that marking the rapid increase in cardiac growth between adolescence and maturity—the tomato should be discarded as likely to occasion unpleasant symptoms and precipitate evil. The period when it seems foolhardy for women to use this fruit is at the climacteric, on account of the abnormal cardiac phenomena they excite and the disposition to inflame pre-existing nervous irritability.

The diagnosis of the disorder propria is usually not difficult, if we are once rid of the preconceived notions with which the symptoms enumerated have been connected. One is likely to fall into the habit of estimating by former and more familiar standards. Some effort will become necessary to disassociate them from dyspeptic symptoms and phenomena connected with cardiac lesions. This need becomes the more urgent to my mind, when I recall the fact that of the heart maladies sent to me for diagnosis, a large percentage are functional and fully one-half of these are due to the tomato habit. When once pointed out, however, these cases can scarcely be overlooked or their symptoms confounded. The history will aid us, and if one attack does not satisfy our mental questioning, there will be little loss of time until another opportunity is secured to indulge in a second observation, as patients are loath to accept the theory of tomato poisoning; and under any circumstance humanity, including the medical man, is slow to acquiesce in anything which limits dietetic privileges. While the picture presented may not be as complete as the present aspect of medical inquiry demands, it is as conscientious and faithful as I can at present give.

The best treatment is to abstain from the use of tomatoes. During a paroxysm, and immediately succeeding one, it is needful to employ an antidote to the toxic conditions. This agent should include the capacity to annul the irritation that is local to the stomach and *prima via*, as well as to place a quietus upon the neurosal storm which is usually present in the acute form of the malady. This agent is acetanilid, one of the aniline derivatives; and it is always applicable, except in the chronic cases attended with heart degeneration. The following prescription is as perfect an antidote to lycopersicum poisoning as I have discovered:

℞

Acetanilid . . . . ʒij
Alcohol . . . . ʒij

Misce. Sig. Teaspoonful in water hourly until three doses are taken, thereafter every eight or ten hours.

This clears the vision, restores the wandering senses and rapidly places the organs within range of their lost tonicity. On its exhibition there is almost immediately a clarification of the visual and mental fields, and a return, within an hour after the first or second dose, to a desirable circulatory and respiratory calm. Some slighter neurosal phenomena as tremor and general depressions are more deliberate in their leave taking.

Antiacid diuretics are needful to divest the bodily fluid of the influence of the lycopersic acid. Quiet and general hygienic restrictions are always commendable.

There is a peculiar virulence to lycopersic acid that can not easily be overpowered, and its effects remain apparent in the stomach and intestines for some days, despite the use of alkaline purges and occasional draughts of lime or potash water. The use of disinfectants is to be commended, as of creosote, charcoal, etc. Observations of the patient's diet are necessary in a special way. The most wholesome articles of diet in ordinary conditions must, in many of these cases, be avoided. Milk is not admissible immediately after, or during an attack, as it forms into a substantial curd, and is totally undigested. Eggs are rendered rancid. The diet should be restricted to light foods and those easy of digestion, and this restriction should be continued for at least one week. Tonics and supports for the offended nervous system are to be employed, and when greatly irritated they dedemand sedative treatment. The former may be secured by the administration of strychnine. The latter is accomplished by the use of chloral or the bromides. Chloral acts well if the patient is persistently somnolent.

The circulatory changes involving myocardial degeneration or including sclerosis of the tubes will suggest recourse to special cardiac support and remedial agents.

To a number of medical men I owe my thanks for faithful observations and the record of facts associated with the use of the *Lycopersicum esculentum* in public institutions, hospitals, and alms houses, which I can not detail here.

Personal experiences are in my possession, delivered orally and in writing by those who have individually noted the deleterious effect of the acute attacks as exemplified in their own bodies and which are not within the scope of this paper to recite. They, however, suffice to prove the tenable ground upon which this theory is based. General depression is reported to have been a common sequence to their employment in one of the alms houses near Pittsburg and also, in several of the hospitals in the vicinity. Many of those who were in health were reported as being depressed, while the ill were rendered worse after their use. This would lead us to the conclusion that those in charge of hospitals, alms houses and other charitable institutions in which they are employed should expunge them from the list of foods.

The supplies for the military should never include this vegetable, as it has been abundantly proved that it can not be for the physical good of the men or sub-serve the interests of hygienic and enonomic food supply.

At any time when any great mental or bodily endurance is required, the tomato is treacherous and can not be relied upon as a food. When some acute loss or bereavement occasions emotional influences that call for cardiac reserve force, and under all circumstances where fortitude is demanded, the ingestion of tomatoes is to be discouraged. Those who are called upon to endure loss of sleep or mental strain, the student, the speaker or the statesman, will find them worse than useless.

AN EDUCATED NOSE.

By Charles E. Page, M. D.
Boston.

Who has not seen a dog plant himself by the outer door and place his nose as close as possible to the crevice over the sill in order that his nostrils may feel the breath of life uncontaminated by the exhalations of the lungs of the other members of the household, as behind closed windows the indoor air is breathed over and over again? He has an educated nose, and he has no more fear of putting it into a current of fresh air than he has of dipping it in the current of fresh water of a running brook when he is thirsty.

To any one accustomed to an outdoor life, and particularly one who has managed to have his life while indoors freshened with the nearest possible approach to outdoor air by means of profuse ventilation of the dwelling, there comes immediately a feeling of oppression, little short of gasping for breath, on entering the average dwelling, particularly on the approach of cool weather in the fall and during the winter when about the only ventilation is by means of keyholes and crevices of windows and doors, even though the latter are not sandbagged or rubber stripped. Dr. Oswald in his "Physical Education" chapter on Indoor Life, relates that General Sam Houston, the liberator of Texas, who had passed many years as a voluntary companion of the Cherokee Indians, was ever afterwards unable to prolong his presence in a crowded hall or ill-ventilated room beyond ten or twelve minutes, and described his sensation as one of "uneasiness, increasing to positive alarm, such as a mouse may be supposed to feel under an air-pump."

An experiment was once tried on two canary birds, one being placed under a glass cover and allowed to remain till he became weak and listless from exhaustion of the oxygen of the air, when number two was placed beside him. The latter at once began to flutter and showed signs of great distress and in a very short time fell over apparently dead. On removing the cover the first bird began to show some sign of life and finally after quite a long time recovered, while the one suddenly forced to breathe the vitiated air could not be resuscitated. He was killed out and out, his system not having had the opportunity of acquiring any degree of tolerance for carbonic acid poisoning and oxygen starvation as had his mate.

It is indeed wonderful what a capacity the animal organism has for acquiring a tolerance of such evils as tobacco, alcohol, tea, coffee, foul air, etc. Not that these poisons can ever be taken with absolute impunity as far as relates to their remote effects; but if the dosage be small enough at first and only gradually enough increased, the tougher ones amongst us manage to live and thrive in spite of constant repetition of a dose which would prove at once fatal to any one wholly unaccustomed to the evil. This is illustrated by the experience of every tobacco user in his boyhood, when a few whiffs of a cigar or pipe made him deathly sick; whereas he can now smoke continually for ten hours at a stretch without experiencing any special inconvenience. But while the system has acquired a degree of tolerance for the drug, nicotin, preventing it from killing him at once, it is all the same gradually undermining his health. His "tobacco heart" is likely any moment to fail him, either in part or altogether. The less vigorous users of tobacco who stick to the habit are falling out all along the line, from the age of twenty-five to thirty-five or forty, dying of this, that or the other "disease," which has, of course, been promoted by every unnatural practice indulged in by the victim.

"To save foul air for the sake of its warmth is very poor economy," as the author already quoted has so tersely remarked; but it is the kind of economy almost universally practiced to a greater or less degree in the efforts of householders to keep comfortable in the winter. "We can't afford to heat all out doors," growls the penny-wise and pound-foolish man who buys the coal, when some one with the "educated nose" ventures to open a window to prevent a feeling of suffocation. A son or daughter of the house may linger and die of consumption, a disease of shut windows and over-"resting" when the life, and a deal of cash-money too, goes for the bad advice and worse medicine, might be saved by a trifle extra expenditure for coal and wise advice as to physical training, if perchance the proper instructor can be found to teach the laws of life. Generally the doctor's bill, in case of sickness, is much larger than the coal bill, even if the windows are kept sufficiently open to secure fairly fresh air to the inmates of the home, which would tend to prevent disease.

THE RELATION OF HORTICULTURE TO HEALTH.*

By William R. Lazenby.

In discussing the relation that horticulture bears to health, not physical health alone, but intellectual and spiritual health, have been considered. In like manner, the products of horticulture, as well as horticulture as a vocation or recreation, are taken into account. First, let us consider the effects of the use of our common garden and orchard products, as a part of an every-day diet.

There is a great deal of talk about health and diet that is equally foolish and hurtful;—foolish because it subserves no good end, and hurtful because it tends to fortify the pernicious idea that our bodies are in such a wretched condition as to need constant tinkering, and that some sort of self-medication is a positive duty.

Like malaria, this affection is everywhere. How shall it be treated? In the place of this wide-spread delusion there should be an inbuilt conviction that there are certain articles known as foods, in the choice of which and in the quantity used each one has daily opportunity to exercise the virtues of common sense and moderation. But foods are not medicines.

A medicine is something which is taken into the body to produce a certain specific and unusual effect, the object being to counteract some injurious tendency or abnormal state. If taken when not needed its effect is likely to be directly injurious. In order to maintain strength and vigor, and repair waste, the normally healthy body craves what is wholesome, not what is medicinal. When a thing has real medicinal value, it is almost certain to be unwholesome as a general article of diet. There is an old tradition,—even now quite generally believed, although gradually fading away,—that anything that affords us simple physical pleasure is dangerous, if not absolutely sinful.

So when one eats freely of fruits, he does not feel justified in simply saying he does so because he finds them agreeable; he likes and craves them, but is constrained to look wise and solemnly observe that "fruits are very healthy." Some even go so far as the German prince, and have for each bodily ailment a different variety of fruit. The prince said, "Whenever I meet with any misfortune or affliction, and am disposed to give way to my grief, I order a young goose nicely roasted, and eat as much thereof as I can: I always find that I rise from the table far less unhappy." Let us banish the idea of making a drug-store of our fruit-gardens and orchards, and cease looking upon the family fruit-basket as a sort of homœopathic pill-box!

"Blessed are they that hunger and thirst," can be said as truly of our bodily wants as of our spiritual necessities: not blessed because they shall be medicated, but because "they shall be filled,"—filled with what tastes good, with what gives genuine and lasting pleasure.

In satisfying our hunger for fruit,—fruit that is well matured, juicy, and fine flavored,—we get perhaps the highest

---

*Read at the Annual Meeting of the American Association for the Advancement of Science in the Section on Horticulture, August 1896. Reprinted from the *Medical and Surgical Reporter*.

form of palate gratification with the least possible digestive effort.

Our ordinary fruits contain the following substances in greater or less proportions:—

1. A large percentage of water.
2. Sugar, in the form of grape and fruit sugar.
3. Free organic acids, varying slightly according to the kind of fruit. For example, the predominating acid is malic in the apple, tartartic in the grape, citric in the lemon.
4. Protein or albuminoids, substances containing nitrogen, which resemble the white of eggs, and are its equivalent in food value.
5. Pectose, the substance which gives firmness to fruit, and which upon boiling yields various fruit jellies.
6. Cellulose or vegetable fibre, the material that forms the cell walls, and which is found in all parts of plants.
7. A very small percentage of ash or mineral salts.

The substances named above are, with the exception of cellulose, essential constituents of a perfect diet. The percentages of the different nutrients are so small, however, that most of our fruit has little actual food value. For example, the nutrients contained in the strawberry, according to analyses made at the Ohio State University, are as follows:

Carbohydrates	8.0 per cent.
Protein	.3 "
Fat	·0 "

It has been estimated that the minimum daily ration of nutrients for a man of average weight, performing an ordinary day's work, is:

Carbohydrates .	500 grams,	or 17.6 ounces.
Protein	118 "	" 4.2 "
Fat	36 "	" 2.0 "

A simple calculation will show that a person would have to consume about 200 ounces, or thirteen pounds, of strawberries daily in order to obtain the proper amount of carbohydrates from this source.

In order to obtain the necessary amount of protein from the same source, a daily consumption of 1400 ounces, or eighty-eight pounds, of strawberries would be required.

This would be a task that even the most ardent admirer of this fruit could scarcely be prevailed upon to attempt. Take another illustration from the vegetable, rather than the fruit-garden.

The nutrients contained in the tomato are as follows:

Carbohydrates	2.5 per cent.
Protein	.8 "
Fat	.4 "

Applying the same calculation as before will show that one would have to eat 500 ounces, or 31.2 pounds of tomatoes each day for the requisite fat; he would have to eat 525 ounces, or 32.8 pounds, for the necessary protein, and for the carbohydrates it would require 704.4 ounces, or about forty-four pounds. In other words, if one should eat forty-four pounds of tomatoes every day, he would consume slightly more fat and protein than were absolutely necessary for a day's supply, and just about the right amount of carbohydrates.

This demonstrates that, however valuable strawberries and tomatoes may be as a part of an every-day diet, they cannot be considered as foods. Their actual nutrient value is exceedingly low. In order to support life and maintain strength, strawberries and tomatoes must be eaten in connection with other substances which have more concentrated nutrients. Wherein does their dietetic value consist? Let us briefly consider. The qualities which render fruit and many of the more delicate garden vegetables wholesome, and cause us to have a natural appetite for and hence to enjoy them, are their acid juiciness and flavor. The juice is mainly water, but it comes to us in a grateful and refreshing form. The flavor is due in part to the organic acids already mentioned, but mainly to certain volatile oils or aromatic ethers. It is to these latter that those delicate characteristic flavors of various varieties of fruit are chiefly due.

Chemistry and physiology have taught us that, when these "fruity acids," oils, and ethers are taken into the body, they undergo oxidation, which process tends to lower the temperature of the blood, or at least to modify our temperature sensations, and thus correct, or allay, any slight feverishness that may exist. They also tend to keep the organs of secretion, the liver, kidneys, etc., in a healthy condition. We are justified, therefore, in saying that fruits are "cooling, aperient and grateful." In our climate, subject as we are to rapid changes and extremes of temperature, passing abruptly, as we often do, from an arctic winter to a tropical summer, the physical system is naturally more or less debilitated.

In this condition we are predisposed to malarial troubles, particularly if we live where the drainage is poor. Fruits and acid vegetables are found to be good correctives for this debilitated condition of the system. The free acids of fruits, especially citric and malic acids, are highly antiseptic bodies. They tend to prevent disease germs from finding a lodgement and development in the body.

The full beneficial effects of these acids are only to be found in mature fruits. Green, unripe fruits, although they have an abundant supply of acids, are usually injurious, on account of their indigestibility. This arises, mainly, from the coarse and hard condition of the cellulose. When fruits are perfectly developed and properly matured the cellulose is soft and fine. We know that unripe fruit is not wholesome. It digests slowly, often ferments in the stomach, and is the cause of painful disorders. It is unwise to take into our stomachs that which will ferment and decompose; it is certainly no less unwise to eat overripe or wilted fruit, in which these destructive changes have already begun. The question is often asked whether such and such a fruit is healthy, even when the question has no special reference to the condition of the fruit itself. All fruits that are eaten ought to be healthy. That is, they should be well matured, sound, and free from disease. As a rule, such "healthy fruits" are for most of us wholesome, although they are neither food nor medicine.

The best results possible from the dietetic use of fruits and vegetables come from eating those that are fresh, healthy, and properly matured, and which have been produced by our own skill and industry.

MENTAL THERAPEUTICS.

THE wonderful influences of the mind on the complex nutritive processes and on the various diseased conditions of the body are readily acknowledged by every observing physician. The old saw, faith in the medicine and confidence in the doctor, has not only a foundation in fact, but an explanation in science. The more we think on the possibilities of mental therapeutics, the more we become convinced of its wide range of practical application. So much advantage, however, is taken by quacks and other pretenders of the well-known credulity of their victims, that the truly scientific observer has been loath to investigate the subject in the calmness of a judicial examination or with the unprejudiced aim of a seeker after fundamental truths. That the general subject deserves more earnest attention at our hands must be apparent to every thoughtful man who endeavors to explain certain nervous phenomena of almost daily occurrence, but which on casual examination appear beyond reasonable comprehension. Such, at least, is the conviction of Dr. A. T. Schofield, who, in an address on "Mental Therapeutics," published in a recent issue of *The Lancet*, strives to aid investigators in this new and attractive field of study. It will not be necessary for our present purpose to do more than offer in outline some of the main points upon which he bases his argument in proof of the intimate correlative agencies affecting mind and body and their direct bearing on both the natural and the perverted nervous tendencies. He starts with the assumption that the conscious mind, or ego, is but a very small part of the vast subconscious mind upon which it rests. The former has its seat in the cortex only, governing reason, feeling, and volition, while the latter "is connected with—or may we not say is the active principle of?—all life that lies below, including reflex action." While it is not possible to be conscious of any vibrations that do not reach the surface of the brain, the vast majority of impressions are directly and uninterruptedly transmitted through it to the subconscious mind, which thus becomes the storehouse and registry of all those intricate and complex energies which make up the responsive vital reflex of our varied and impressive environment. Although full consciousness is the result of the combination and interaction of the two conditions named, the conscious mind so-called becomes a party to the impression only when the latter is focussed on the cortex by the direct attention of the individual affected. To go a step farther, the author assumes that the cortex not only receives impressions from without in a primary and direct way, but is also subjected to like impressions secondarily and indirectly from the subconscious mind. In the one case, there is an immediate and easily understood recognition of the impression, while in the other the phenomenon is not only without explanation to the individual, but is entirely beyond his control. In the latter category are mentioned unconscious habits, unconscious cerebration, and the like. The conscious mind, when it wills, dominates the unconscious, and thus in its own imperious way interprets sensations to suit its purposes, diverts normal processes into abnormal directions, changes the rhythm of vital processes, disarranges the nutritive machinery of the body, and even tampers with the pain signals in its mad misrule. Dr. Schofield says truthfully :

"The cortex, or surface of the brain—the seat of conscious mind—is a special factor for good or evil in every disease. Every organ and function is represented there, and there brought into vital unity. Professor Laycock says: 'The hemispheres, as the organ of thought and mental action proper, are in unity with all the processes of life whatever, whether they be termed vegetative or animal.' Indeed, the unity of the body and to a great extent of the 'ego' is found in the cortex. Bain shows that all tissue nutrition is influenced from this great centre, and most physiological acts can be arrested mentally by its action. It controls unconsciously anabolic and katabolic cell action; and there is no doubt that a sound, cheerful mind, acting through it, is a great protector against disease of all sorts, and if disease has a hold a cheerful mind can often cure it. Mental therapeutics can be applied to the body in one of three ways: (1) By the unconscious mind directly—in spiritual or physical influences and surroundings; (2) by the unconscious mind acted on by the conscious indirectly—in rousing faith in persons, remedies, or places, etc.; and (3) by the unconscious mind acted on by the conscious by direct effort—in determination to get well, to shake off illness to ignore pain, etc. With regard to the ailments for which mental therapeutics is useful, it is a powerful means of cure in all organic and inorganic diseases, while in hysteria and allied neuroses it is the only reliable means of permanent efficacy."

He then gives several interesting instances of the influence of mind, conscious and subconscious, in ordinary disease and on the natural habits of thought and action in the human organism.

"A patient suffering agonies with toothache was told by her medical man to apply to the tooth a silver coin wrapped in silver paper. Believing it to be infallible, she did so several times and was relieved. One day, however, she was told the remedy was wholly mental, and at once it was powerless. Here is an instance of the pernicious effects of the conscious mind inhibiting after first aiding the subconscious. Unzer, in 1771, says: 'The expectation of the action of a remedy often causes us to experience its operation beforehand.' I have just received a remarkable illustration of this, that, however, goes beyond this statement. A colleague of mine gave a patient the other day some opium pills to produce sleep, but forgot to mention their object. Last week he found the pills had acted well each morning, but the patient had had no better sleep. Another patient thought she had taken a large dose of rhubarb as a remedy for constipation, and the thought was effectual. Hunter says: 'By my will I can fix my attention on any part until I have a sensation in that part;' while Muller affirms that it may be stated as a general fact that any state of the body which is expected with certain confidence will be very prone to occur as a mere result of that idea. It is easy to produce symptoms by suggestions. If, for instance, you press some particular part of the spine of a neurasthenic and say, 'Do you feel any pain here?' he may say 'No.' But if you persist in your suggestion for half a dozen times, and the nervous centres are at all susceptible, he will say, 'Yes,' and the pain suggested by you will be felt. Now this is true with regard to producing cures as well as in producing diseases. The action of the subconscious mind in presenting a fact to the conscious mind is remarkably illustrated in a recent story of Sir R. Quain's. He was sent for by a man, aged forty years, who had a delusion that his body had an offensive smell, and he even covered up his pictures lest they should be tainted. No smell could be perceived, but a most fetid iliac abscess was found and opened. His idea, therefore, was not a delusion, but a recognition through his subconscious mind of his condition."

By way of illustrating the power of suggestion in the treatment of so-called imaginary troubles, he mentions the value of the time element in connection with the watching of the mantel clock for indications of dosage:

"The real value of the clock in this, as in other cases, is truly scientific, and depends for its potent effects on rapidly formed accurate psycho-physical habits, or artificial reflexes, in the brain. A woman about seventy years of age came to me in deep distress about her obstinate constipation, which was so severe that every enema and pill had failed and mechanical evacuation was the last resource. This condition had continued for some years. The patient was of exceptionally powerful mind and will and remarkable intellect. Seeing this, I relied upon the clock as an efficacious aperient. I explained the power of an exact habit over the bowels, and told her she would be cured if at 9.30 A.M. exactly by the clock on the mantelpiece she sought relief each morning. She was at first aided artificially at the exact hour, but after a few mornings when 9.30 A.M. arrived, and she was taken out of bed, the bowels began to act, only she sometimes wanted to relieve them before the hour. This was never allowed; she was told that to be too soon would prevent the result as much as being too late. At the end of six weeks the bowels were duly relieved without medicime at half-past nine exactly, by the power of subconscious habit, and at the end of six months she had never missed a day. She has now no further trouble."

It is probably within the experience of many of our readers that similar cases are to be found, in which the method of dosage was more than the dose itself, the placebo more powerful than the real drug, and, best of all and at the bottom of all, the belief that the doctor understood the case and knew exactly the best remedy to give. It is fair to assume, if the range of psychophysical ailments is great, there should be an equal power of mental therapeutics to cure them. The highest recommendation for mental therapeutics is that it is not dangerous, that it is susceptible of further profitable cultivation, and that it may serve in many obscure and apparently desperate cases in effecting a cure when all the usual means have failed.—*Medical Record.*

HOT ROOMS AND CATCHING COLD.

We are so accustomed to the formula that American houses are always overheated, and it has become so much the fashion among medical men to attribute catarrhal troubles to this cause, that it is interesting to learn of an English writer who thinks it is better to be warm than cold in winter. Dr. William H. Pearse, writing in the *Scalpel* for September, says that he ventures to differ from the popular belief, that there is special danger in going from a hot room into the open air, holding, on the contrary, that the heat of the room or house is a great preservative from chill or "catching cold" on going out into the open air. In Russia, in Central Europe, Canada, and the Northern United States, houses are made very warm with a dry heat in the winter, yet men, women and children go out into a temperature below zero. The stimulation and heightened condition of the circulation and nerves, and ultimate molecules of protoplasm, give a great power of resistance to the outer intense cold, preventing "chill" in the first exposure until exercise with its infinite motions, as it were, takes up and maintains the conditions of resistance. Dr. Pearse says that he has walked at midnight from a highly heated mansion across Boston Common, in his dress coat only, on a calm starry night, the temperature about zero. He suffered no inconvenience, and felt sure that the stimulus of the heat of the house gave him power of resistance to the cold.

Dr. Pearse is undoubtedly correct in his observation that one can come from a hot room into the cold outer air and run but little chance of catching cold. The danger is rather in entering a hot room from without, and especially in entering an overheated and unventilated apartment filled with excrementitious products from the lungs and skin of its inmates. A change from a hot to a cold atmosphere can be made suddenly, but that from extreme cold to indoor heat should be made gradually if one would avoid the catarrhal consequences of "catching heat."—*Medical Record.*

PROGRESS IN THE PREVENTIVE TREATMENT IN CHOLERA.

The May number of *Annales Pasteur* reports another forward stride in our knowledge of cholera and the methods of preventing it. Roux, Metchnikoff and Taurelli announce that they have established the fact that cholera is an intoxication, and to combat it an antitoxin serum is required, and not an antimicrobian, as Pfeiffer asserts. This serum they have succeeded in producing for experimental purposes. Animals injected with it before they are inoculated with the comma bacilli resist the action of the latter in most cases, while animals inoculated without it almost all succumb. The same favorable results are obtained if the serum is administered simultaneously with the bacilli culture. But the results are negative if it is administered after the inoculation. The serum, therefore, is not curative, but it is preventive, which is, however, a great advance. The experimenters hope to secure better results when they have obtained a stronger serum.—*Annales de la Société de Médecine et Chirurgie de Liège*, June.

Department of Physiological Chemistry.

WITH SPECIAL REFERENCE TO DIETETICS AND NUTRITION IN GENERAL.

Edited by J. HOBART EGBERT, M.D.

THE BILE: ITS COMPOSITION AND OFFICES IN THE HUMAN ECONOMY.

THE bile is a highly complex fluid secreted by the hepatic cells of the liver. From these primary cells the bile is carried off by small ducts—the so-called "bile capillaries"—which coalesce to form larger channels until, at the transverse fissure of the liver, they become the right and left hepatic ducts. Issuing from the liver at this point, these two unite to form a common hepatic duct which, in turn, unites with the cystic duct of the gall-bladder to form a common excretory duct for both liver and gall-bladder—the *ductus communis choledochus.* The common bile duct then passes direct to the duodenum, pierces its outer portion, and, after running obliquely in its wall for a short distance, opens on its mucous (inner) surface, about three inches below the pyloric orifice of the stomach.

Human bile as secreted by the hepatic cells, is a slightly alkaline fluid of golden yellow color, possessing a bitter taste, having a specific gravity of about 1020, and containing from twelve to fifteen per cent. of solid matter. After it has remained long in the gall-bladder it becomes viscid from admixture with mucus and may exchange its original bright tint for a greenish or reddish brown color. The secretion of the bile is continuous and it is stored up in the gall-bladder until required for the uses of the economy. When the acid contents of the stomach enter the duodenum a reflex action occurs which occasions contraction of the gall-bladder and a pouring out of the bile into the intestine. The quantity of bile daily produced by the liver is considerable—somewhat over a quart (from 35 to 45 fluid ounces) being secreted in twenty-four hours by an adult man.

This work of the hepatic cells in producing the bile is one of those all important and ever interesting performances peculiar to vital processes, for the greater part of the specific biliary substances are manufactured by the liver and not simply removed in a ready-made condition from the blood.

Chemical analysis of bile shows it to contain cholesterin, lecithin, mucin, bile pigments, sodium salts of the bile acids, mineral salts and water.

Cholesterin ($C_{26}\ H_{44}\ O$) although occurring in very small quantities is invariably present in bile. In healthy, fresh bile it is held in solution by the two bile soaps—sodium glyco-cholate and sodium taurocholate—and hence cannot be discovered in its normal crystalline form. The chief interest of this constituent of the bile resides in the fact that it forms the chief constituent of the concretions known as gall-stones. Cholesterin also occurs in the blood, the brain, the spinal cord and nerves, and in many pathological fluids—as pus, the fluid contents of ovarian cysts, hydrocele, etc.

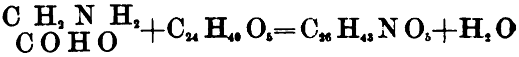
Lecithin ($C_{44}\ H_{90}\ N\ P\ O_{3}$) is found in very minute quantities in bile. It also occurs in the brain, while traces may be found in pus and in blood. Lecithin is notable in physiological chemistry as belonging to a small group of complex organic bodies which contain both nitrogen and phosphorus. Like cholesterin, lecithin in bile is probably derived from the metamorphosis of nervous tissues and, being absorbed into the capillary circulation, reaches the liver where it is eliminated.

Mucin, an organic nitrogenous body containing the elements C, H, N, O, greatly resembling the proteids but containing no sulphur, is found in bile and frequently occurs in rather large amount. Mucin is common to all mucus secretions and is found in the saliva, gastric juice, synovia, etc. "Mucin is unquestionably a product of the differentiation of the protoplasm of certain animal cells, and is obviously derived from the proteids." (Gamgee.) The burden of mucin in bile is evidently derived from the mucus of the walls and follicles of the bile ducts and gall-bladder.

Bile pigments. The yellow color of the bile of man and of the carnivora is due to the presence of a pigment called *bilirubin* ($C_{32} H_{36} N_4 O_6$); while the green color of the bile is herbivora—and that of man and the carnivora after oxidation—is due to the pigment *biliverdin* ($C_{32} H_{36} N_4 O_8$). These pigments are derived from the coloring matter of the blood, for bilirubin is considered by most physiological chemists to be identical with haematoidin, a pigment found in old blood deposits. Biliverdin is simply a more highly oxidized state of bilirubin. Both of them when reduced with nascent hydrogen yield hydrobilirubin ($C_{32} H_{36} N_4 O_5$) which is identical with urobilin, a bile pigment derivative in urine, and with stercobilin, a bile pigment derivative found in the fæces. Bile pigment differs from blood pigment in that it contains no iron. Small quantities of phosphate of iron are present in bile but not in bile pigment.

The green stools so common in infant diarrhœa depend for their color upon the oxidation of the bilirubin of the bile in the small intestines and its conversion into biliverdin, by the action of lactic and butyric acids which are formed by fermentative changes occurring in the milk upon which the infant is fed. The administration of alkalies and attention to other means for preventing fermentation of the food, soon restores the normal color to the discharges and checks the diarrhœa. When in indigestion of adults fermentative changes occur in the contents of the stomach, with regurgitation of bile, the bilirubin of the bile which reaches the stomach is frequently converted by oxidation into biliverdin, which imparts a green color to the material vomited.

The sodium salts of the bile acids are two soaps, sodium glycocholate and sodium taurocholate. The bile acids from which they are derived are glycocholic and taurocholic acids. Glycocholic acid ($C_{26} H_{43} NO_6$) is a compound of glycocine and cholalic acid, the union of these two substances occurring in the hepatic cells.*



$$\begin{matrix} C\ H_2\ N\ H_2 \\ C\,O\,H\,O \end{matrix} + C_{24} H_{40} O_5 = C_{26} H_{43} N O_5 + H_2 O$$

Glycocine. Cholalic Acid. Glycocholic Acid. Water

Taurocholic acid ($C_{26}\ H_{45}\ N\ O_6\ S$) is a compound of taurine and cholalic acid and, like glycocholic acid, is manufactured in the chemical laboratory of the liver.

$$C_2H_7NO_3S + C_{24}H_{40}O_5 = C_{26}H_{45}NO_7S + H_2O$$

Taurine. Cholalic Acid. Taurocholic Acid. Water

Both glycocine and taurine are formed in the intestines during the pancreatic digestion of proteids. Glycocholic acid is especially abundant in the bile of herbivora and of man; while taurocholic acid, though present in the bile of man, is especially abundant in the bile of carnivora. In the intestines these acids take up water and split up again into cholalic acid, glycocine and taurine, which may be graphically represented by reversing the above equations. Glycocholate and taurocholate of sodium are very sparingly present in the fæces and only represented to a slight extent in the urine. It is calculated that about seven-eighths of these bile salts are re-absorbed from the intestines and returned to the liver in the form of the simpler constituents, viz: glycocine, taurine and cholalic acid—into which they are resolved in the intestines—being again united in the liver to form the bile salts. Appreciating, then, this physiological cycle of chemical events and understanding that the liver normally depends upon the recovery from the intestines of so large a proportion of its bile salts, it is easy to understand why the liver becomes quickly deranged during an attack of profuse diarrhœa, when the bile salts which should be returned to the liver are swept away in the stools, and how similar results are produced by faulty intestinal digestion which retards the resolution of the bile salts and their subsequent re-absorption.

The mineral salts found in bile do not greatly differ from similar constituents of blood. According to Weidenbusch, whose analysis of the mineral ingredients of bile has long been accepted as trustworthy, chloride of sodium, tribasic phosphates of sodium and potassium, carbonate of soda, phosphates of lime and magnesia, and small quantities of iron, manganese, and silica, are present.

The amount of *water* in the bile is somewhat variable; ordinarily, however, ranging from eighty-five to ninety per cent. Prolonged retention of the bile in the gall-bladder tends to a concentration of this fluid and a reduction of the proportion of water. In non-inflammatory fevers and diseases obstructing the venous circulation of the abdomen, various observers have noted a similar effect. On the other hand, the proportion of water in the bile appears to be augmented in diabetes, inflammatory diseases of the lungs, ascites and dropsical affections.

Abnormal ingredients may sometimes be detected in the bile. The most important of these are albumen and urea. Albumen occurs as an ingredient of bile in organic disease of the liver and in Bright's disease of the kidneys. Urea has been found in bile in cases of uræmia, Bright's disease, cancer of the kidney, and cholera. After extirpation of the kidneys in animals, urea promptly appears in the bile.

The offices of bile in the economy are mainly related to digestion and absorption and may be summed up thus: Bile assists in the conversion of starch into diffusible sugar; it assists in emulsifying and saponifying fats and aids their absorption; it increases peristaltic action of the bowels and prevents prutrefactive changes in the intestines. The chief work of the bile is in promoting the digestion of fatty substances. This it does by acting as an emulsifying and saponifying agent and by directly aiding osmosis. Emulsification aids their digestion, saponification aids their diffusion, and by moistening the villi of the intestines, through which absorption occurs, the bile greatly facilitates the osmosis of fatty material. This latter is easily demonstrated experimentally, for mucus membrane welted with bile allows minute globules of fat to pass readily through it.

Bile stimulates the normal peristaltic movement of the intestines and thus aids their natural evacuation, and although only weakly antiseptic it obviously retards putrefactive decomposition of the contents of the intestines. In cases of obstructive jaundice when no bile is poured into the intestines, there is a tendency to constipation and flatulence and the evacuations are particularly offensive.

Although the secretion of bile by the healthy liver is continuous, the amount secreted during a given period of time is largely influenced by circumstances. In general, during normal digestion the amount secreted augments, but, as Bidder and Schmidt long ago observed, when the stomach is overloaded with food the secretion of bile is likely to be retarded. These same investigators ascertained that when animals are deprived of food for a longer period than twenty-four hours, the biliary secretion continuously decreases. Thus, in cats which had been deprived of food for ten days, the quantity of bile secreted on the tenth day did not exceed the fourth part of what they secreted during the twenty-four hours immediately succeeding a meal.

Nasse found that the addition of fat to the ordinary meat diet of a dog caused a considerable augmentation of the biliary secretion, but it is found that when fed exclusively on fat animals secrete no more bile than if they were actually starving. The imbibition of copious draughts of water always increases the quantity of bile secreted, both fluid and solid constituents augmenting. The administration of calomel increases the watery portion but not the solid constituents of the bile. All experimenters have observed that the secretion of bile is diminished when the animals under observation present symptoms of fever.

It is to be remembered that at all times the amount of bile excreted is in very small proportion to that secreted. According to Berzelius, only about one-fortieth of the bile is excrementitious, *i. e.*, actually discharged from the body. The balance is re-absorbed from the intestine and, though usually in simpler form, returned to the liver to again participate in the work we have been considering. Animals upon which artificial biliary fistulæ have been made for the purpose of studying the biliary functions appear loath to give up the bile which is thereby extracted for, unless prevented by being muzzled, they lick the bile from the external orifice of the fistula and thus restore it to the system through the stomach.

Purified ox bile figures in the Materia Medica as a remedial agent. Since its effect when taken into the system seems to be similar to that of the natural secretion, it has been administered in cases of deficiency of the biliary secretion. It is also recommended as a tonic and laxative.

◆

DIET AND HYGIENE IN EPILEPSY.

IN THE Cavendish Lecture on "Dreamy Mental States," delivered before the West London Medico-Chirurgical Society, Sir James Crichton-Browne, M.D., LL.D., F. R. S. called attention to the following data concerning epilepsy:

> Epilepsy does occasionally go on into extreme old age without perceptible impairment of intellect or general health. It is sometimes even hinted that epilepsy, or the morbus sacer is advantageous to intellectual development. We are told that Julius Cæsar and Mohammed and Marlborough and Napoleon and Wellington were epileptic, and are led to infer that that disease is almost an essential condition of great military genius, and the names of Molière and Sheridan and Balzac and Flaubert and other eminent writers who have been epileptic are mentioned in order to suggest that that disease is sometimes a valuable ingredient in literary talent. But a strict examination of all such cases brings out the truth that when the epilepsy did not come late in life, as a result of cerebral wear and tear, it did not promote, but to some degree marred, the genius or ability on which it was grafted. No doubt cases are encountered in which lifelong and violent epilepsy has proved not incompatible with great and sustained mental vigor. I have known a magistrate who at eighty years of age was a model of shrewdness and industry, and was still taking an active part in county business, and who had from puberty suffered from epileptic fits at short intervals; and there are, I believe, men similarly afflicted now filling important public positions with usefulness and distinction. Dostoieffsky, the great Russian novelist, was from youth subject to epilepsy of the worst type, and yet, notwithstanding this malady and intolerable hardships endured during imprisonment, penal servitude in Siberia, and enforced military service, he lived to the age of sixty and went on to the end producing novels which will make his name live forever, and in one of which he has delineated with minute observance and rare fidelity the symptoms of his own disease.
>
> But such cases are exceptional. The rule is that epilepsy is a blighting, a crippling, a destroying disease. Our asylums, workhouses, prisons, and hospitals are full of the débris of its storms, and the flotsam and jetsam left by these may now and then be recognized floating hopelessly in the stream of population in our streets.

Before dismissing the subject the lecturer called attention to a very important factor in the rational treatment of this, as of other affections, and spoke as follows concerning diet in epilepsy:

Whatever the effect of a liberal diet of animal food may be upon the healthy understanding, there can be little doubt that it is prejudicial to the mental power of epileptics. Just twenty years ago one of my colleagues, Dr. John Merson, carried out at the West Riding Asylum in a masterly way a series of observations bearing on this point, He placed two groups of epileptic patients on a nitrogenous and farinaceous diet respectively for a fixed period,and then for a like period he changed the dietary of the two groups, giving those patients who had had a farinaceous diet a nitrogenous one, and those who had had a nitrogenous diet a farinaceous one. The patients on whom he experimented were of a chronic and confirmed class—patients in whom long continued epilepsy had resulted in mental deterioration; and yet even in them marked results were obtained. In fourteen out of twenty-four cases there was a decided decrease in the number of fits during the farinaceous diet,and in a very considerable number of cases it was observed that soon after the nitrogenous diet was commenced mental dullness and stupidity supervened, the patient passing into a state of hebetude, which only disappeared when a farinaceous diet was again resorted to. Quite recently Dr. Sydney Short, of Birmingham, made observations on the same subject, and found that in a number of epileptic patients, also of a chronic class and inmates of the City Infirmary, a reduction in the amount of meat in their diet was followed by a diminution in the number of fits.

What we now urgently need are accurate and extended observations on the influence of diets of various kinds, including and excluding several classes of constituents, in epilepsy and allied conditions, and experiments, scientifically devised and carefully guarded, with drugs. We possess remedies which have elective affinities for certain nerve centers, and which therefore promise to be useful in epilepsies of certain kinds; and for my part I will not believe that there is any finality in treatment, or that we have not in store for us the discovery of means of dealing with epilepsy and its allies even more potent than that medicine which Sir Charles Locock with such happy perspicuity placed in our hands as a weapon against them, at the very time when it had been omitted from the London Pharmacopœia because of its supposed uselessness and inertness. It is disheartening to reflect, however, that so little is being done, and that the material at hand is not more largely utilized. There are in our asylums and workhouses to-day enormous numbers of epileptics, the majority of whom are, I believe, as far as medical treatment is concerned, left to jolt down the hill of fatuity headlong and heedlessly, or with only the temporary application of the bromide brake now and then.

We are certainly indebted to Sir Charles Locock who first called the attention of English-speaking practitioners to the value of bromide of potassium in the treatment of epilepsy (*London Lancet*, May 20th, 1857). To this day great reliance is placed in the continued administration of full doses of this drug and it is doubtful if there is anywhere in civilized countries a community wherein bromides are not employed in the treatment of epilepsy. But regardless of the drugs used in the relief of epilepsy, whether preference is given to bromides, to valerianates, to cannabis, hyoscyamus, or what not, great attention should be paid to diet and general habits of life. These are days when patients may greatly aid in their own restoration to health, and when remedial measures which cannot be dispensed by druggists are frequently important factors in the successful relief of abnormal physical conditions.

The diet in epilepsy should be plain and unstimulating, devoid of meat and many nitrogenous foods, and absolutely excluding alcohol. Where the state of the digestive organs will permit, a certain amount of fatty and oily food-stuffs may be consumed with advantage; while cod-liver oil is frequently beneficial. Light systematic exercise in the open air, measured by the strength and general condition of the patient, is to be insisted upon; while daily tepid, salt-water baths, with friction and massage of the surface of the body and other measures for the maintenance of a healthful activity of the capillary circulation of the skin are of great importance. Much mental work is to be avoided, especially in the case of children who should usually be kept from school; though, if their general health is good, older patients may follow some light occupation. Everything capable of inducing reflex nervous disturbance must be avoided and every vicious habit overcome—propriety and regularity characterizing every walk in life. Epileptics should retire regularly at an early hour, should have from eight to ten hours sleep, always lying with the head elevated in the bed.

SOME EFFECTS OF DIET ON THE EXCRETION OF URIC ACID.*

By **Alexander Haig**, M. A., M. D., Oxon, F, R. C. P., Physician to the Metropolitan Hospital, and the Royal Hospital for Children and Women.

I HAVE for many years been pointing out that a large number of diseases are due, entirely due, to the presence of excess of uric acid in the blood and tissues. In the course of my investigations I discovered that uric acid could be introduced into the body and blood by the simple process of swallowing it. It had previously been believed and taught that uric acid when thus taken was converted into urea, and did not remain as uric acid in the blood or tissues. Now this discovery, made by me in 1892, has already given us a very great increase of power to control the quantity of uric acid in the body and blood, for it has shown that the uric acid of pathology is to a very large and important extent made up of the uric acid which is swallowed day by day in the food; and as it is quite easy to control this, we step at once into possession of a very important power of control over all diseases due to uric acid, in so far as they are functional and have not already produced structural and organic changes.

I propose now to show by means of curves some of the changes in the excretion of uric acid that can be produced by diet, and to mention shortly some of the diseases which are found to be more or less completely controlled by such diet.

* * * * * * *

From these facts I think we may conclude that it is possible by avoiding entirely all animal foods that contain xanthin compounds or uric acid, and also tea, coffee, and cocoa—whose alkaloids are similar xanthin compounds—to limit very greatly the introduction of uric acid into the body, and when the stores and accumulations already in the body have been eliminated to keep the excretion of uric acid in the urine always below the relation to urea of one to thirty, and that when this has been done all functional disease due to excess of uric acid in the body and blood will diminish and disappear.

Now it will very probably at once be asked how we are to tell in any given case when the body is clear of uric acid, and when the possessor of it may therefore expect freedom from uric acid disease?

I think that this can be done by means of a dose of salicylate of sodium, for when the body is clear of uric acid a dose of that drug will no longer make it rise to any great height above urea.

I think, also, it may be safely said that if any one takes an equivalent dose of salicylate of sodium and gets as the result an excretion of uric acid greatly above the relation to urea of 1 t6 30, such person is by no means free from uric acid or the disease it may cause, and is either introducing considerable quantities of uric acid with his daily food or has still considerable stores of the substance waiting to be dissolved out of his tissues.

By altering the diet it is possible to diminish very decidedly the excretion of uric acid; and even in a few days to make it less, but it will take many months—possibly twelve to eighteen, or more—to clear out the stores and accumulations.

The required alteration of diet is governed by very simple rules, which can be grasped by any one in a few moments of thought. We have to cut out from "ordinary diet" all articles that contain either uric acid or xanthin compounds that can be converted into it, and we have thus to eliminate all animal foods except milk and cheese. But we must provide nitrogen enough to keep urea constantly about 3½ gr. per pound of body weight per day, and we must therefore replace the animal foods left off by other things containing albumens. Now this can be done chiefly from

---

*Abstract from *British Medical Journal.*

three sources: (1) milk and cheese; (2) pulses, as lentils, peas, beans, dholl, etc.; (3) cereal foods, as wheat, barley, oats,and things made from them. And when we consider that meat contains about 25 per cent. of albuminates, while the pulses contain 22 per cent., cheese 33 per cent., the cereals from 8 per cent. as bread to 10 per cent. as oatmeal, and milk from 3 to 4 per cent., there can be no difficulty in replacing one class of foods by its equivalent in the other, so that urea, nutrition, and strength shall remain unaltered.

The diseases that react to this treatment are practically the whole of those about which I have written, and it will be found that I have not made my claims one bit too large; for uric acid acts in the production of diseases (1) through the circulation which it controls throughout the body; and (2) as a direct irritant of fibrous tissues and joints, and the above control of the diet suffices eventually to control its evil activity in both these directions.

The diseases which best and quickly give evidence of the good effects of this control are the purely functional ones, headache, mental depression, and the high blood pressure which accompanies and causes them; these are followed at variable distances by anæmia and other blood diseases, albuminuria and Bright's disease, epilepsy, gout and rheumatism. On the other hand, it is quite possible, by administering uric acid in any of the forms mentioned above to increase both the daily excretion in relation to urea and the amount than can be swept out by a salicylate. And with this and as its result, there will be a marked increase of all the functional troubles which are due to uric acid in the blood. When the uric acid headache has been properly diagnosed and the above treatment carried out, I look upon cure as almost a matter of certainty, and much the same holds for high blood pressure, mental depression, sleeplessness, and other kindred troubles. Then with regard to Bright's disease, as some of its chronic forms are to be regarded merely as the last stages of unrelieved migrane, it follows that the cure of the functional disorder, which is both easy and certain, is equivalent to the prevention of the more serious organic disease.

As regards anæmia, I pointed out in this Section two years ago, that the value of the blood decimal varies from day to day with the amount of uric acid excreted in the urine. At that time my blood was much less free from uric acid than at present, and my blood decimal now exceeds its value of two years ago by 10 per cent. or more. And every disease I have written about will react very decidedly to the practical increase or diminution of this substance in the body and blood, and I claim no disease as due to uric acid which will not do so.

THE RATIONALE OF THE ACCEPTED TREATMENT OF GOUT.*

By Archibald E. Garrod, M.A., M.D., F.R.C.P.

Haig, who has devoted the labor of years to the experimental study of the part played by uric acid in the production of disease, takes as his starting point the relation between the urea and the uric acid excretion, which he believes to be, under normal conditions, a practically constant relation of 33 to 1.

When, as is often the case, the uric acid excretion falls below this ratio, he believes that such fall is due to the retention of uric acid in the organism and its storage in the spleen or elsewhere, while he attributes a corresponding rise in the proportion of uric acid to urea to the washing out from its lurking places of the uric acid thus stored away.

The strongest argument in support of this view is afforded by the fact observed by Haig and others, that when a drug is given which leads to a relatively increased excretion of uric acid, the increase falls off after a time and the normal ratio is once more restored. A series of events which is, of course, readily explained if we suppose that the store of retained urate has become exhausted.

---

* Abstract of a paper read before the West London Medico-Chirurgical Society.

Upon the existence of such a constant ratio between uric acid and urea formation, and upon the explanation which he offers of the observed deviations from this ratio, the validity of the greater part of Haig's views obviously depends; but it must be noted that the existence of such a constant relationship is by no means acknowledged by all, nor is it easy to see how such a ratio can be maintained if, as Horbaczewski believes, the uric acid excreted in the urine is derived chiefly or wholly from leucocytes. Lastly, it is necessary to notice a conflict of opinion upon another point. Whereas Ebstein and Haig, together with some other observers, regard the presence of urate in solution in the blood as noxious, others, among whom is Sir William Roberts, attribute its power of producing gouty lesions solely to the tendency to the deposition of crystals of sodium biurate in the tissues. Although amid such a conflict of opinions and results it seems hopeless to look for any sure foundation for a rational system of treatment of gout, three results to be aimed at clearly present themselves:—(1) Whether the accumulation be due to excessive production or to deficient elimination of uric acid, it is equally desirable to limit, as far as possible, the formation of uric acid in the body; (2) it is desirable to promote the excretions of the accumulated urate in the urine; and (3) it is desirable, if possible, to remove the deposits of sodium biurate in the solid tissues. If, however, we hold with Ebstein that the deposition is secondary to an ulcerative process produced by the urate dissolved in the blood, this last indication will have comparatively little importance except for the removal of deformities.

The methods by which it is attempted to obtain such results are as follows:—(1) By controlling the diet of the patients; (2) by enjoining exercise; (3) by the administration of drugs; and (4) by the use of natural mineral waters, both internally and externally. Let us briefly consider these several methods of treatment in turn.

(1) *Diet.*—The course of diet usually prescribed for the gouty was not based upon the more modern views of the pathology of the disease, but was arrived at empirically before these were thought of. It is certainly almost universally accepted that the ends of treatment are most nearly obtained by the limitation of the nitrogenous elements in the food—by cutting off meat to a greater or less extent.

We may, I think, take it as an established fact that the total daily excretion of uric acid is greater on an animal than on a vegetable diet. The investigations of Hermann, Marès, and Horbaczewski, all show this. When, however, we pass to the explanation of this fact, we find the same conflict of opinions as in other parts of the subject.

The ordinary view has been that the more proteid introduced, the greater will be the amount of urea and uric acid that is formed from it. Haig has estimated the amount of uric acid contained in various articles of diet, and while he assigns to cold roast leg of lamb .050 per cent. of uric acid, the amount in meat extract reached .883 per cent. His experimental results tend moreover to show that administration of uric acid by the mouth tends to increase the amount excreted in the urine, and he ascribes this increase chiefly to such introduction.

He sums up his views on this point as follows:—

"With regard to diet, we can give the main point in very few words, for we have seen that as flesh diet increases the introduction of uric acid, it increases the formation of uric acid, and its salts diminish the excretion and elimination of uric acid. A milk and vegetable diet, on the other hand, introduces less uric acid (because urea is not necessarily high), and its salts promote the free elimination of all uric acid that is introduced into, or formed in, the body."

Horbaczewski states that the increase in the uric acid coincides with the leucocytosis which occurs after food, and refers it to the nuclein yielded by the destruction of the leucocytes. Experimenting with healthy men, he found that after a meat meal the leucocytosis and uric acid excretion were both decidedly greater than after one consisting of vegetable food. Haig, on the other hand, associates the increase after a meal with the occurrence of the alkaline tide.

Pfeiffer states that in the urine of gouty patients much more "free" uric acid is present than in that of healthy individuals, and from his observations of the effects of treatment upon the tendency to excrete this "free" uric acid, he comes to the conclusion that the limitation of nitrogenous diet is quite unnecessary. He holds, indeed, that such restriction may be absolutely detrimental. I may mention that the validity of Pfeiffer's conclusions, from the results obtained by his uric acid filter, has been challenged by Sir William Roberts in this country, and by Ebstein in Germany.

If we accept the prevalent view, that it is desirable to limit the nitrogenous food of gouty patients, we must, of course, remember that in this, as in all other respects, each individual case requires to be treated upon its merits, and it would obviously be unwise to prescribe an identical diet for a stout gouty man of sedentary occupation and habits, and for another who spends a large portion of every day in pursuits which bring the muscles into active use.

With the regard to the carbo-hydrate elements in the diet, I am unable to find any adequate ground for the widespread belief that sugar *qua* sugar is bad for gouty patients—a view which, I take it, had its origin in the injurious influence exerted by certain sweet wines and articles of food. Obviously, if sugar itself is injurious, all starchy substances must be the same, seeing that starch is converted into dextrose by the digestive secretions. Pfeiffer, indeed, on similar grounds to those which lead him to recommend meat diet, recommends the exclusion of carbo-hydrate as far as possible. Yet since there is no reason to ascribe to a carbo-hydrate diet any property of increasing uric acid formation, it can only prove injurious in this respect, if at all, in an indirect manner, by disturbing the digestion.

Again, there is no evidence that alcohol *qua* alcohol increases uric acid formation or hinders its excretion, and yet it is one of the best established facts about gout that certain alcoholic beverages are very harmful to those who have the gouty tendency.

The comparative rarity, nowadays, of cases in which the tophaceous deposits are large enough to produce extreme deformities, is referred, and apparently with good reason, to the changes in habits during the last few generations in the matter of alcoholic drinks, and especially to the greatly diminished consumption of port. Yet we do not know what are the actual constituents to which port, champagne, and the heavier ales owe their injurious action, or how far these are due to the presence of the products of incomplete fermentation.

Dr. Haig believes that the above alcoholic beverages owe their effects to their acidity, for he finds that the administration of acids always reduces the excretion of uric acid as compared with urea, and, as has been said, he ascribes such disturbances of the proportion of the uric acid and urea excretion to retention of uric acid in the system. From his point of view the administration of a glass of champagne is equivalent in this respect to that of a dose of acid. It is obvious that this explanation is capable of accounting for the scanty gout-producing properties of alcohol itself, as evidenced by the rarity of the disease among populations among whom spirit drinking is prevalent, to the exclusion of the consumption of beer and wines. On the other hand, alcohol, by producing chronic renal disease, will, if Levison's views are correct, itself favor to some extent the development of gout, just as does chronic poisoning by lead.

Physical Exercise.—Concerning the effect of exercise upon uric acid excretion, such observations as have been made by Levison, Haig, and others, point to a decided increase under its influence.

At first sight such observations seem to explain satisfactorily the fact which has long been recognized and which may be regarded as established, that a sedentary life favors, while an active life tends to ward off, the recurrence of attacks of gout. But we must not forget that an increased excretion, unless it can be shown to be accompanied by an increased production of uric acid, is not necessarily beneficial to a gouty subject, and, *a priori*, there is a great probability that the increased excretion due to exercise is really the outward sign of an increased production due to a more active tissue metabolism. Levison, indeed, holds that excessive muscular exertion thus favors the development of an attack, and quotes Scudamore in support of this statement.

Drugs.—Among drugs the alkalies may be conveniently considered first.

Different observers, whose results are brought together by Von Noorden, in his valuable work on "Die Pathologie des Stoffwechsels," to which I am indebted for much valuable aid in the preparation of this paper, ascribe to alkalies different effects upon the excretion of uric acid. Thus Clar found a decided increase after their administration; Salkowski noted an equally decided diminution, and Hermann could not find that any influence was exerted by the taking of large quantities of the salts of vegetable acids.

Haig assigns to alkalies a most important influence in favoring the excretion of uric acid, in contra-distinction to the effects of acids above referred to. He believes that alkalies carry out the urate from organs, such as the spleen and liver, in which it has been stored way, and that its consequent presence in the blood is apt to be manifested by raised pulse tension, uric acid headache, and other phenomena due to this same cause.

This action of alkalies he connects with their solvent power upon uric acid, and summarizes his results by stating generally that "all substances which increase the solubility of uric acid increase its excretion and clear it out of the body, while conversely all substances which diminish its solubility diminish its excretion and tend to produce its retention in the body and accumulation in various organs and tissues." He states, moreover, that, "speaking generally, and apart from the action of other solvents, it may be said that the excretion of uric acid from day to day, and hour to hour, is inversely as the acidity of the urine."

It has usually been held that drugs which form soluble compounds with uric acid are eminently suitable for administration to gouty patients, but to the chemist such reasoning appears to rest upon an erroneous basis, for he knows that, in the laboratory, acids tend rather to combine with the bases with which they form the least soluble compounds, and that it is vain to endeavor to get an acid into solution by presenting to it a base with which it forms a compound more soluble than that which actually exists.

Some prefer to administer sodium compounds, others those of potassium or lithium. Sir William Roberts, in the course of his investigations of the factors which influence the solubility of precipitation of sodium biurate from solutions of water in blood serum and synovial fluid, found that no condition so greatly favored such precipitation as the addition of sodium salts, and he points out that the distribution of uratic deposits bear a striking relation to the percentage of sodium salts contained in the several organs and tissues. On these grounds he recommends a restriction of the intake of sodium chloride by gouty patients. He further states that alkalescence, as such, has no influence whatever upon the solubility of sodium biurate, and speaks very doubtfully of the efficacy of alkalies in general in the treatment of gout.

On the other hand, there are many medical men who have long employed alkalies in the treatment of gouty conditions, and who are firmly convinced of their utility, apart from any actual reasons by which their efficacy can be explained.

Haig obtained the remarkable result that lithia actually diminishes the excretion of uric acid. This apparent exception to the rule which he lays down he explains by quoting Rose's work on Chemical Analysis, in which book it is stated that lithia taken by the mouth forms a nearly insoluble triple phosphate with phosphate of soda, or with the triple phosphates of ammonia and soda. Haig supposes that not only is lithia thus prevented from getting at the uric acid at all, but also favors the retention of uric acid by withdrawing from the blood some of the sodium phosphate which it contains—a substance which, in the presence of an alkali, he has found to increase the uric acid excretion.

With the alkalies must be classed the organic base piperazine, and still more recently introduced lysidine, both of which have been extensively employed in gouty cases, on account of their remarkable power of dissolving uric acid. As to their efficacy very conflicting opinions are expressed, and it is obviously a matter of extreme difficulty to form an estimate of the power of a drug to ward off the recurrence of gouty attacks, which even in untreated cases are irregular in their appearance. Some hold them to be of great value, while others, such as Sir William Roberts and Levison, have formed a very poor opinion of the utility of piperazine. In a recent paper Grawitz states that he obtained much benefit from the administration of lysidine in some cases of tophaceous gout, but Klemperer and von Zeisig observed no noticeable influence of this drug in three typical cases. A similar conflict of statements prevails as to the influence of these drugs upon uric acid excretion, which several competent observers have declared to be *nil*. Even Haig, who lays so much stress upon the relation between the action of a drug in this respect and its power of dissolving uric acid, states that although piperazine increases the excretion of uric acid, its action is not very potent, and is far less conspicuous than that of the salicylates. Biesenthal, on the other hand, states that even in the presence of an excess of uric acid, not the biurate, but the neutral urate of piperazine, is formed, which salt is excreted intact by the kidneys, and seems to have a much greater diffusibility through animal membranes than sodium biurate has.

I trust that some future speakers will bring forward some clinical evidence of the efficacy or inutility of piperazine in the treatment of gouty attacks, or in warding off their recurrence.

Colchicum.—There is a tendency at the present day to minimize the good effects of this drug, which our fathers regarded as practically a specific in true gout, and to emphasize the ills which may result from its depressant action. I must take my stand with those who hold that colchicum has a remarkable curative power upon acute attacks of gout, and that not only is this effect obtained by means of much smaller doses than are usually given but also that when given in such smaller dose (m v.-xv.) it is but little apt to produce any ill-effects provided that its use is avoided in cases in which the heart's action is exceptionally feeble.

It must be confessed, I think, that no adequate scientific explanation of the action of colchicum has yet been found. Haig's belief that this drug gives relief in true gout by increasing the alkalinity of the blood—that, in fact, it acts an an alkali—seems to me hardly to afford an explanation of its efficacy, even when taken in conjunction with its depressant action, to which he attributes its effects upon joint lesions which are rather the sequelæ of gouty arthritis than true gouty phenomena.

Sodium Salicylate.—To this drug Haig attributes a remarkable efficacy in all conditions resulting from an accumulation of uric acid in the system, and among these in true acute gouty arthritis. He finds that the salicylates cause an increase of the uric acid excretion, forming with this substance the compound known as salicyluric acid—a compound more soluble, not only in neutral, but also in slightly acid liquids. He advises their administration apart from any alkali, and in amounts such as are given in acute rheumatism. This author attributes the adverse statements which have been made partly to the administration of insufficient doses—such as 10 grains three times a day—and partly to errors of diagnosis, the joint lesions following upon acute gout being confused with the true gouty arthritis.

I am far from being convinced of the great efficacy of sodium salicylate in true gout, and I could quote high authorities in support of this attitude. It will be of great interest to hear the opinion of any here present who have administered sodium salicylate in adequate doses in unquestionable cases of acute gouty arthritis, and I trust that some such experiences will be brought forward this evening.

Levison, who is one of the most recent writers upon the subject, says that sodium salicylate, "owing to its success in acute rheumatism, has also been tried in gout, but has by no means proved of like service in this disease." Sir Dyce Ducworth, too, ranks the salicylate much below colchicum in the treatment of acute attacks, but acknowledges them to have succeeded in his hands in some cases in which colchicum has failed to give relief.

It is obviously very important to make sure that the increased excretion under the influence of salicylate, is really due to a removal of stored up uric acid, and not to an excessive production of that substance; and in this connection the results of a recent investigation by Bohland, only published last month (in the *Centralblatt für innere Medicin*, 1896, No. 3), are of much interest. Bohland found that the administration of sodium salicylate is capable, as Haig states, of producing a conspicuous increase in the amount of uric acid excreted in the urine, but that this increased excretion corresponded with an increase of the leucocytes of the blood. He adds: "We may then draw the conclusion from our experiments that moderate doses of sodium salicylate cause an obvious increase of leucocytes in the blood, and if Horbaczewski's theory is correct, a considerable leukolysis, and in consequence an increase of the uric acid excreted." Bohland concludes from these considerations that the employment of sodium salicylate in the treatment of gout is not to be recommended, since the increased formation of uric acid, which he believes the drug to cause, is only likely to lead to a further deposition of urate in the tissues.

We must bear in mind, however, that the validity of Bohland's conclusions is dependent upon the truth of Horbaczewski's theory already referred to, and however probable this theory may appear, we must always remember that the origin of the uric acid from the destruction of leucocytes is still a theory, and not, as yet, an established fact.

Guaiacum.—I have no facts to bring forward throwing light upon guaiacum, which I believe to be very great, especially in articular cases of the more chronic and lingering type as well as in what used to be called "irregular gout." Its employment must be looked upon as purely empirical.

Mineral Waters and Baths.—Many of the mineral waters which prove most serviceable to gouty patients contain very scanty mineral ingredients, and their effects would seem to be largely due to the copious drinking of water than to any special ingredients. Take, for example, two of our own principal mineral waters which have long had a merited renown for the treatment of gouty patients. I refer to those of Bath and Buxton. Both places possess thermal waters with little mineral impregnation, and Continental resorts of the same class might be quoted.

We know little of the effect of mere taking of water, hot or cold, upon the excretion of uric acid, and such results as there are, are as usual conflicting. Genth found, in 1850, that copious drinking of water diminished and finally abolished the excretion of uric acid; whereas Schondorff, after a prolonged investigation, came to the conclusion that the taking of water had no influence at all; and Kusmanoff, whose results, like the previous ones I quote from Von Noorden's work, already referred to, came to a similar conclusion. We find, then, in such investigations bearing upon this point as have hitherto been made do not afford any scientific basis for the beneficial effects of water drinking upon gouty subjects, or lend any countenance to the wide-spread idea that such treatment acts by washing uric acid out of the system. Nevertheless, I imagine that we shall none of us on this account cease to advise our gouty patients to follow a plan of treatment which long experience has shown to be beneficial to them.

Alkaline waters, such as those of Vichy or Ems,—a class of which we have no representative in our own country—have doubtless effects similar to those of ordinary medicinal treatment, by alkalies; but some of the waters which enjoy a high reputation for the treatment of gouty subjects, such as those of Wiesbaden and Homburg, contain large amounts of sodium chloride, the very salt which Sir William Roberts considers especially to be avoided. In support of his views on this point Sir William Roberts quotes the statements often made by medical men practising at such saline spas, that in some instances the earliest effect of the treatment is to provoke an attack of articular gout.

I do not know of any observations bearing upon the effects of simple mineral baths upon uric acid excretion, but the douche massage system associated with the name of Aix-les-Bains, where it was originated, may be supposed to act in a similar way to ordinary bodily exercise, increasing the excretion, and probably also increasing the formation, of uric acid.

Dr. Forestier, of Aix, has made some observations upon this point. He quotes the results of the douche massage treatment in three cases of gout. In each instance the excretion of uric acid was increased, as also was that of phosphates and of urea. He found that a course of about twenty such baths sufficed to restore the excretory functions to their normal state, and to produce all the improvement which such treatment is able to produce.

HOW TO CURE RHEUMATISM.*

By Elmer Lee, A. M., M. D., Ph. B., Vice-President American Academy of Medicine; Chairman Section on State Medicine, American Medical Association,
Chicago, Ill.

The names of diseases are determined, principally, by the prominence of a certain group of symptoms. The disease under consideration follows the general rule. Special names are attributed to particular groups of symptoms, all of which, however, constitute merely varieties of one disease.

Rheumatism is acute when it is recent, and chronic when the disease has extended over a longer period; articular, when the manifestation is chiefly in the joints; inflammatory, when the whole body exhibits the symptoms of inflammation and pain; muscular, when relating to the striated and non-striated tissues; sciatica and lumbago belong to the same family; even gout is itself closely related in in its origin, differing only in its symptomalogy.

The present paper is concerned with a practical review of the author's system of managing this disease in its various forms.

Disturbance of nutrition, with consequent impairment of the solids and fluids of the body, always precedes rheumatism. In-

---

*Read in the Section on Practice of Medicine, at the Forty-seventh Annual Meeting of the American Medical Association, at Atlanta, Ga., May 5-8, 1896. *Moody's Magazine of Medicine.*

vasion of the soft tissues cannot take place unless the functional activity of both structures is impaired. It is impossible to name the first symptom in the series of alterations of the elementary forms. But in almost all cases which have come under observation, certain functions are almost uniformly abnormal. Variation in the volume as well as the nature of the fluid elements of the body, and changes in the quality and proportion of the solids, are constant factors in the pathology of rheumatism. The influencing or producing causes of these changes in the body are, indeed, hard to exactly discover. But fortunately, they are not indispensable to successful treatment of the condition that requires remedial aid.

Whenever there are functional changes they consist, for the most part, of abnormal muscular action in some portion of the body, principally with reference to the capillaries and small arteries. The same condition may be an exciting cause of other diseases, the peculiar symptoms determining the character of the affection, being dependent upon the state of the general system of the individual. Thus a given influence may produce in different individuals quite contrary symptoms. With disturbed nutrition, alterations of the fluids and solids of the body are accompanied by obstructions in the circulatory and excretory systems. Lowered vitality is the necessary result, which is the basis upon which rheumatism is determined. If functional activity remains normal, the vital resistance of the soft structures prevent retention of the impurities. There is no one portion of the economy which suffers alteration so readily as the çirculating fluids. Upon the relative maintenance of the normal proportion of the fluids and solids the health of the body depends.

It has been found by examinations of the blood that there is a loss of balance between the fluid and solid ingredients. It has also been determined by scientific investigation, that the origin of diseases lies largely in the imperfect circulation of the fluid elements of the body through the capillaries, altering in turn the functional activity of the lymphatic vessels. Congestion is a disturbance or an obstruction in capillary circulation, whether it be in the surface of the body or in some internal organ. The consequent result, which follows even a slight interruption in these minute passages, produces obstructions which in turn, undergo changes that are fatal to the life of the elementary cell. If the harm done is slight, and the balance of the circulation is quickly regained, the symptom of this disturbance may not even be appreciable to the central nervous system. If, however, a great number of slight disturbances in the capillary circulation occur, the resulting evidence is determined by symptoms which are noticeable. There are many causes which may produce impeded vascular circulation in the minute spaces, the chief of which is some form of exposure of the body to external influences. The first impression upon the system is necessarily received by the nervous system, and through it the influence is carried to the muscular structures. If the vitality is sufficiently strong the evil influence is scarcely appreciable, for it is the natural tendency of the system to recover from disturbed equilibrium. Few individuals there are whose physical condition is normal; consequently, the result of even a slight cause of physiologic disturbance is often productive of disaster. The point of my argument, at this time, is to establish the value, in the maintenance of normal health, of the part which is performed by preserving the quality and the volume of the circulating fluids.

The capillaries are so exquisitely small, that even the red cells themselves are unable to enter them. The watery element of the blood alone finding its way through the millions and millions of these diminutive channels. The ultimate cell depends for its nutrition upon the albumin, the fibrin, and the salts which are held in solution by the water of the blood. Ever so small a disturbance is capillary circulation interrupts the processes of nature, and, if these instances occur sufficiently frequently, morbid products are retained in the lymphatics and the intercellular spaces. The effort of physiologic action to remove and expel these products, when retarded, constitutes the first element in inflammatory processes. The accumulation of these minute centres of interrupted action establishes an appreciable area of disease, which spreads more and more according to the state of the tissues. When the area of inflammation is sufficiently large, and destruction of cells is advanced, the heat of the body is augmented, both by the decomposition of the morbid products and by the physiologic disturbances produced throughout the system, constituting an inflammatory fever. With the determination of the fever, other symptoms appear which hitherto were not present in our picture of pathological changes.

The exact pathology of rheumatism is undetermined. The analyses of the blood indicate no chemic or organic changes. The cellular structures are identical with those of usual conditions found in health. Lactic acid and uric acid and other chemic substances are not found to prevail to a greater degree than at other times. The only change that is discoverable is the diminution of red corpuscles. The various theories concerning the cause and origin of rheumatism, in the light of the exact knowledge, determined by physic and chemic analysis of the blood, are not satisfactory. The exact knowledge on the subject consists in the single, positive statement that there is alteration in the number of red cells of the blood. In addition to this it is also able to be definitely stated that there is diminution in volume of the fluid element of the blood. These facts would seem to throw the responsibility upon the capillary circulation rather than upon change in the blood chemistry. It is upon recognition of the foregoing physical alterations of the blood that my practice in the treatment of rheumatism is founded.

Post-mortem examinations reveal no changes not found in other diseases. Chemic analyses of the fluids and solids of the rheumatic body are also negative in showing the origin of this disease. The flow of urine is greatly diminished, and through this condition it is able to determine that the volume of the blood is also diminished, corresponding precisely to the symptom of scanty urine. The average number of cases in which the urine has been calculated as to the quantity shows a uniform decrease, as well as an increase in color and specific gravity.

After very careful examination of the extensive literature on the subject of rheumatism, my conclusions are as follows: That rheumatism is, so far as the conditions of the solids and fluids of the body are concerned, a disease not dependent upon the chemic changes of the fluids or the solids of the body. The only definite knowledge that is irrefutable, is that there is a change in the physical character of the blood, consisting of an alteration of the relative proportions of fluid and solid elements.

The inflammatory processes which take place are similar to those in other diseases under similar conditions. The differences in the forms of rheumatism are produced by variations of the intensity of the disease and the state of health at the time of the attack of the individual. The three principal symptoms of rheumatism, namely, pain, fever, and swelling, are able to be explained by my hypothesis. The condition of impaired nutrition and functional derangements of the bowels, either constipation or diarrhœa, is almost constant.

Clinical experience teaches me, therefore, that the first indication in the treatment of this disease is the supply of proper and sufficient nutrition. The next indication is attention to the processes of elimination by which the system is relieved of dead matter. Nature is the greatest remedial influence in the cure and whatever introduces new strength and saves the vitality is the safest therapeutic. Next in order in the line of remedial measures is to restore and preserve the normal volume of the blood. If there is a reduction in the number of red blood-corpuscles, that reduction, it is found, is only relative, for there is a consequent loss of serum. This condition is exactly determined to be true by quantitive estimation of the urine of each twenty-four hours. The high specific gravity of urine which is referred to as a prominent symptom in febrile diseases, is evidence that there is deficiency in the liquid element of the blood. Nothing could be more natural than a waste through the kidneys in proportion to the volume of blood serum, so that this symptom is so slight in importance, relative to the ease with which it can be corrected, that it is a surprise that so much is made of it in referring to the symptoms of disease.

Every one of these pathologic and physiologic changes which have been enumerated in the paper are directly amendable to control by the proper use of hydriatics. There is no question as to the fact. It has been so many times proven in my clinical work during the past period of six years that it is no longer subject to the least doubt in my mind. It is not altogether an easy matter for those not acquainted with hydriatics to give full credence to such positive statements, unsupported by clinical demonstrations in hospital wards. Neither is it an easy matter to learn the various processes which constitute intelligent and commonsense use of water pertaining to the cure of this disease.

Before detailing the plan which is regularly followed in my practice, it is my wish to lay before you some therapeutic measures which were recently employed in the treatment of a case of acute rheumatism in one of the metropolitan hospitals. The recital of this list of remedies may be instructive, as it furnished me many points for thought and criticism of the prevailing measures in vogue to-day in the treatment of rheumatism. The list comprises the following drugs and remedies used upon one and the same patient, the result of which was the fatal termination of the patient.

Here it is: Salicylic acid, salicylate of soda, gaultheria, salol, salophen, antipyrin, iodide of potassium, wine of colchicum, iron, arsenic, strychnin, bicarbonate of soda, epsom salts, bromid of sodium, morphin, turpentine, lanolin, lard, digitalis, cod-liver oil, whisky, and menthol in alcohol. Great stress was placed upon the fact that 15-grain doses of salophen, combined with 15-grains of bicarbonate of soda, were borne by the patient at intervals of every two hours. The patient grew steadily worse from the inception of the treatment, and it would be strange indeed had it been otherwise. The criticism of this plan of treatment is not owing to a lack of an orthodox education, or to ignorance on my part of the recommendations of materia medica. The practice of therapeutics has been going on for a period of perhaps over three thousand years, and while the list of remedies presented above does not represent the sum total of our ability in the treatment of rheumatism, neither does it reflect creditably upon the education and the intelligence of a learned profession, and it is not strange that odious comparisons are instituted by the laity on the advancement of surgical treatment compared with that of medicine. There is some excuse in the allied sciences of electricity and other departments of physics for imperfect processes, and room for further scientific development; but it seems to me there is hardly the same excuse for a class of highly educated, broad-thinking men who have had so many centuries during which to work and in which to perfect the treatment of diseases of the human body.

We must remember that steam and electric energy are discoveries of comparatively recent years, and that further improvements are in order and perfectly natural; but we must also remember that the human body, with its physiologic and pathologic nature, has been known and practiced upon for more than thirty centuries. What hope for the future would there be if the foregoing list of remedies should be taken as the total of our ability in the treatment of this disease? If our science was no older than steam or the telephone, our mistakes would be but natural and pardonable. It is not wholly the fault of the physician that such an incongruous and contradictory collection of substances should be used in the treatment of rheumatism. The education of the people and the use of drug remedies from childhood almost force physicians to employ them in the treatment of their cases. Besides this, the circulation of enormous quantities of spurious medical literature by commercial agents, advocating and urging the use of their patented and proprietary preparations, has a harmful and misguided influence upon the younger members of the profession, who are eagerly seeking, and ready to receive information which purports to represent the very latest ideas in therapeutics. It is not my purpose to condemn or to harshly criticize any one in particular, but rather, in a sympathetically critical attitude, to point the way to the truth.

The treatment of rheumatism by hydriatic processes is based now upon an experience in practice during a period of six years. The plan which is pursued is satisfactory to the highest interest of the patient and the physician. It is something that is definite; it is reliable, and the gains that are secured in the progress of the treatment are real, and can be determined with an accuracy approaching true science. The only difficulty that is experienced in pursuing the hydriatic plan lies in the fact that it is considered by the patient and friends as novel and, therefore, to be guarded against. Besides, the support of the profession is withheld, owing to misunderstanding, by reason of clinical inexperience, lack of actual knowledge, and doubt, which operate to the disadvantage of both the physician and his patient. It takes a great many clinical experiences to establish the courage of one's own convictions, and until belief is based upon many carefully conducted experiments, there is always room for a question whether it is right or wrong. The disposition is, among clinicians, to prove each point in practice and to lean toward conservatism. For my part, my courage is established, and the practice of hydriatics, according to my experiences, is now approaching a definite and scientific system of therapy.

For the purposes of clinical practice the gross symptoms of rheumatism are sufficient in all cases to determine the line of treatment. It is only where experiments for scientific purposes are instituted that differentiating instruments and chemic tests are employed. When first called to see a patient, it is of course impossible in most cases to exactly determine, even to my own satisfaction, the precise nature of the affection. The first inquiries that are made of the patient refer to the general condition, followed by questions and examinations to determine the details concerning the physiologic functions. Inquiry is especially directed to the excretory system, with reference to the quantity of urine which is passed, the condition of the bowels, the appearance of the skin and the mucous membrane, and especially the state of the appetite, the kind of food taken, and the habits with reference to the nature and the quantity of fluids taken as a drink. The temperature of the body, the movements of the pulse, and the subjective symptoms of the patient constitute a list of inquiries sufficient to determine the treatment. The physiologic requirement of the system is two liters of water per day. In no single instance of a case treated has this quantity been consumed by the patient prior to his sickness.

The treatment is begun by prescribing regular, definite doses of pure, soft water at frequent intervals. Each dose of water contains some harmless remedy to satisfy the notions of the patient and his friends. The amount of water which is prescribed at each dose is scientifically determined by the whole weight of the body, the age of the patient, and the degree of the fever. Starting upon the basis of an average man, two to four liters of pure water is prescribed every day, in properly apportioned doses, to avoid mistakes and excessive use of water at any one time. If the patient were of seventy-five pounds weight my estimate would be that one and one-half to two liters of water would be absorbed per day with comfort and advantage. The next process in the use of hydriatics is irrigation of the bowels if circumstances favor it. One teaspoonful of elixo, a liquid soap, is mixed with the water used for irrigations. Many cases have been treated by me, in which it was inconvenient or undesirable to practice irrigation of the bowels. It is therefore established clinically, that while irrigation is in all cases an aid to treatment, still it is not indispensable.

The third hydriatic process is the use of water upon the surface of the body. If the patient is agreeable to direction and conveniently located, the full bath is recommended. The temperature of the water should be a few degrees below the temperature of the body. When the toilet room is inaccessible or it is inconvenient to remove the patient, three bathing processes are followed in my practice: 1, sponging the body with water from a basin; 2, the wet pack; and 3, the use of my sprinkle-bath. The sprinkle-bath consists of cool water applied to the surface of the body, at intervals of two or three hours, during the day and evening, by means of a small sprinkle nozzle attached to the end of the tubing of a fountain syringe, which is suspended from a chandelier, bed-post, or a nail in the wall. Swelled and painful joints are packed in a compress of cold water until relief comes. Briefly speaking, the foregoing measures have availed in the treatment of rheumatism. The precise detail work must necessarily vary in every case. The food is immaterial; whatever is the most simple, the easiest to provide, and which is agreeable to the patient, is all that is required. Purposely, the recital of cases has been omitted. Such recitals are tedious, and for this reason are omitted from this paper.

Department of Hygiene.

WITH SPECIAL REFERENCE TO STATE AND PREVENTIVE MEDICINE.

Edited by HENRY LEFFMANN, M.D.

INSECTS AND DISEASE.

MANKIND has always been aware of some danger from the insect world. While the species which are distinctly poisonous by the bite or sting are relatively very few, they are more or less familiar. In most cases, however, the poisonous action is local, and though often attended with a disproportionate amount of suffering, rarely imperils life.

The progress of bacteriology has brought to our knowledge another and more serious danger from insects, namely, that of conveying disease. It is now well-established that many disease-producing organisms exist, which either habitually or exceptionally assume intermediate stages of existence by which they may develop or multiply in animals not likely to be infected by the regular form, and enough is now known to indicate that common insects may serve as such intermediate hosts, and thus facilitate the distribution of parasites. It is probable that the work of the common housefly as a disease carrier is a very active one. Some other household vermin which are objects of much greater disgust than the fly, are probably not without indirect effect in conveying contagion. One of the most interesting contributions to this subject has been Dr. Manson's recent researches as to the relation of the mosquito to malaria. These researches were published in the *British Medical Journal.* When an obscure point is explained by scientific investigation it is often possible to note in the earlier literature of the subject a half-knowledge of the truth or a shrewd suggestion of it from general principles. We remember to have seen, a decade or more ago, an argument for the view that mosquitoes are the cause of malaria, the author enumerating twenty reasons therefor. At that time the special parasite on which the disease is now believed to depend was not known. The recent investigations have shown that the mosquito is an intermediate host for this organism, and it is easily seen how this facilitates infection. The mosquito, by sucking the blood of a person already infected with malaria, becomes itself infected—the parasite resides in the blood, especially in the blood-corpuscle—and if the insect makes its way to a pond or pool of water and dies therein, the water will become impregnated with the organism and thus be transmitted to those drinking it. The possibility of malaria being conveyed by drinking-water was for a long while doubted, but is now generally admitted. It might be thought that the processes of digestion in the body of the insect would destroy the parasite, but this is not usual. If the mosquito does not reach water (the male usually dies away from it), the parasite does not perish. It is capable of assuming a resting condition and remaining inactive for a long while. The body of the host drys and is blown about by the winds, to fall ultimately into some moist place, and thus the germ has opportunity to go again into an active state. This power of remaining for a long while in an inactive condition is a curious attribute of lower forms of life and contributes largely to their success in the struggle for existence. It is possible that the mosquito may directly convey the contagion, and there are some cases recorded which indicate that it may convey more virulent diseases. Pustular affections of considerable severity and apparently even anthrax, have resulted from mosquito bites.

The common flies do not pierce the skin, but are so abundant and persistent in haunting our houses, and attending, unbidden and unwelcome, upon our meals from market to table, that more or less contamination by their bodies occurs. They are certainly the regular or occasional hosts of more than one parasitic organism. Fortunately, the flies which get into food either before or during its preparation, generally get well cooked, and while that is not an appetizing incident it is a direct protection, for the body is thus sterilized.

Little is as yet known as to the parasites of the other house-vermin, but there cannot be much doubt that they are directly or indirectly capable of assisting in the conveying of contagion.

The sanitary indications that are derived from the considerations thus briefly set forth are, that we should locate and construct our houses so as to reduce to the lowest point the opportunity for the development of house-vermin. It has been pleasing to note a change for the better in the plumbing work of modern houses. Formerly it was the custom to enclose sinks, bath-tubs, water-closets, and similar appliances, in wood-work, in the crevices of which countless roaches and other vermin would be always found, their development being assisted by the moisture and warmth usually present. Nowadays, these installations are nearly always of metal and are not enclosed, thus frequent cleaning is suggested and easily secured. After the same fashion we may hope for the general adoption of metal frames for bedsteads which will permit of radical methods for destroying any vermin that may lodge in the crevices.

The relation of the mosquito to malarial infection, suggests an important point in general hygiene. Surface-water supplies are known to be subject to many forms of contamination. Manson's investigations indicate an additional objection to them, applicable especially to supplies from shallow lakes or slow-moving streams. These are very likely to become the breeding ground of mosquitoes. This consideration simply leads to the same point to which all our knowledge of the nature of surface-water leads, namely, that such supplies are not safe for use as drinking-water unless filtered, no matter how free from ordinary sewage contamination the gathering-ground may be.

THE HYGIENE OF THE MOUTH.

The remark of Leonato that

> "There was never yet philosopher
> That could endure the toothache patiently,"

finds full acceptance at the present day. Doubtless, a large part of the pecuniary success of dentistry as a profession has been due to the comparative severity of the suffering attendant upon affections of the teeth often seeming out of all proportion to the extent of the lesion. A person may become blind or deaf, or develop incurable and fatal affections of the heart with less warning than may accompany the disease in a single tooth. Dentistry, however, as every other department of medicine, has been subjected to the scientific method, and we have learned that the teeth have a histology and pathology of much greater complexity than was formerly supposed, and that they influence the system at large and are influenced by it to an extent that is not appreciated by the laity, nor as fully as could be wished by many physicians.

The care of teeth involves not only preventing loss of them by decay. The manufacture of artificial teeth has reached such a pitch of artistic and mechanical excellence that as far as these considerations go, the question need not be discussed here. It is concerning the reflex disturbances and indirect injuries brought about by bad teeth that we wish to speak.

It may be taken as a sound principle that whatever tends to create discomfort to the individual will do injury to either mental or bodily health. This statement does not mean that securing comfort in all the senses of that word is the end and object of human desires. It is to comfort in the sense of freedom from pain and disturbed functions that we here limit the meaning. It is well-known that we are conscious of the existence of scarcely any organ of the body when it is in good health. The man who knows (save, as the lawyers say, by unreliable rumor and hearsay), that he has a stomach, has a diseased one.

The condition of the teeth may exert an unfavorable influence on the general health in several ways. In the first place neuralgias of the face and head are very frequently, merely reflexes from decayed or inflamed teeth. Unilateral neuralgias of an intermittent or paroxysmal nature. especially in the region of the cheek, ear, or lower jaw, should suggest a most careful examination of the teeth. Unfortunately, many physicians ignore such methods. Medical men are apt to look down upon dentists considering them mere "tooth-carpenters," indeed dentistry has hardly acquired the dignity of a profession except in its own estimation, although it is worthy of such a distinction. Patients afflicted with these vague neuralgias usually seek a physician's aid at first, and often are put through a course of treatment in which various drugs, old stand-bys and new fads, are used without avail. The patient's general health becomes injured, both by the stress of the suffering and by the dosing. Finally, something suggests or brings about a visit to a dentist who finds either decay or inflammation of the tooth structure and treats the case properly and successfully. The periodical literature of dentistry is largely made up of reports of this character. One lesson that this teaches is that dentistry is properly a specialty of medicine, and that the degree of doctor of medicine should not be conferred on any one who has not had a full course of instruction, didactic and clinical, on the histology and pathology of the teeth. The constructive and reparative work of dentistry, the filling of teeth and the making of artificial dentures, belong to the full course for the degree of D. D. S., but this degree should not be obtainable until after at least a large part of the principles of medicine has been covered.

An indirect effect of diseases of the teeth is the disturbance of the digestive functions. The transformations which are brought about by the chewing of food are, as is well-known, the reduction of the morsel to convenient size and the thorough admixture with the saliva. It is not necessary to dwell here on the importance of thoroughly chewing food; the topic is discussed in every elementary work on physiology or hygiene. If the teeth be diseased, the pain produced by using them leads either to very imperfect chewing or to the selection of those classes of food that require no such preparation. Either plan is objectionable and will be likely to injure the digestive organs and the general health.

It is now established that the ordinary decay of teeth is the result of the action of microbes. The mouth is a culture-oven of a most efficient type. Its temperature is maintained with almost perfect uniformity, its fluids are rich in nutritious substances, the abundant supply of oxygen gives opportunity for the production of oxidized organic products, and hence, acid-forming fermentations are constantly occurring. These acids deprive the teeth of their outer, hard coating and thus expose the real organic living tissue to injury. In civilized life, conditions not clearly recognized, are producing liability to rapid decay. Possibly among these may be the crowding of the teeth by the shortening of the jaw. Even in a mouth full of sound teeth a great variety of microbes may be found, and if the teeth be not regularly cleaned these microbes will get mixed up with the food and be swallowed, thus introducing them into the stomach and intestines. When diseased teeth exist, the opportunity for the accumulation of objectionable microbes is much greater.

Physicians who make a specialty of diseases of the digestive organs occasionally see cases of serious functional disturbance of the stomach in consequence of a condition of the teeth. We know of a case which a general practitioner suspected to be cancer and referred to a specialist, who found that its symptoms were due to a generally bad condition of the teeth. A not uncommon affection is a chronic suppuration the *pyorrhea alveolaris* which figures so largely in dental literature, and this will naturally introduce pus-forming microbes constantly into the stomach.

One form of danger from bad teeth is just beginning to receive general recognition by the medical profession. This is the possibility of their affording a chance for the entrance of pathogenic microbes into the system. The cavities of decayed teeth though actually small are large relative to the size of ordinary parasitic germs and food is apt to lodge and decompose in such cavities in spite of frequent use of the tooth-brush. Through cavities communicating with the nerve channels, especially of dead teeth, accumulations of microbes may be brought in contact with absorbent vessels and find their way into the tissues in which the teeth rest and perhaps be carried some distance from the point of entrance. Articles of food are liable to be infected with a great variety of parasitic germs some of which may find their way thus into points where they may develop and cause trouble.

These considerations lead us, therefore, to the views that no point in personal hygiene is of more importance than taking proper care of the mouth and teeth. In early childhood is laid the foundation of the condition which the teeth will assume in mature life and by proper attention on the part of those having charge of children, much suffering and ill-health may be prevented. It also seems probable that under the strained and artificial conditions of modern life, the tooth brush is not alone sufficient for the care of the teeth, but that mild antiseptic washes should be regularly used.

LENGTHENED LIFE BY SANITATION.

A HALF CENTURY'S RECORD.

For the first time we are furnished, by a report issued from the Registrar-General's Office, with a measure of the improvement wrought upon the public health by public sanitary work during the past fifty years. Dr. John Tatham has worked out a record of decennial health statistics for every registration district and county, and brought it up to the year of the last census. One sees at a glance the history of this improvement in the following table of death-rates per 1,000 persons living:

	1841 to 1850	1851 to 1860	1861 to 1870	1871 to 1880	1881 to 1890
England	22	22	22	21.3	19.1
Lincolnshire	20	19	19	18.6	17.5
Notts	21	22	22	21.2	19.4
Lancashire	28	26	27	25.2	22.4
York—W. Riding.	23	24	25	23.2	20.0
" E. Riding..	24	22	23	21.4	19.5
" N. Riding..	19	19	20	19.7	18.2
Durham	22	23	23	23.8	19.8
Northumberland..	22	22	23	22.7	19.8
Cumberland . . .	21	21	22	21.5	18.4
Westmorland . . .	19	18	18	17.7	15.5

It is evident that almost everywhere the improvement belongs to the last twenty years. Ten years ago, when it was diagnosed, Dr. William Ogle had to say that the saving of life was among young persons only; but now Dr. Tatham shows that in 1881-90 it has affected all ages, save in men, the time of life between 65 and 75. This exception, too, is trivial. Men between those ages have died at a rate heavier only by one per cent.; while the percentages of decrease at other ages have been remarkable. Here are the principal of these: Deaths at all ages, 10.3 per cent. fewer;

under one year, 10 per cent. fewer; one year to five years, 17.7 per cent.; five to ten, 18.4; ten to fifteen, 18.4; fifteen to twenty, 20.3; twenty to twenty-five, 15.7; twenty-five to thirty-five, 9.5; thirty-five to forty-five, 3.7.

The immediate effect of these calculations upon assurance must be to increase the expectation of life at all ages in females, and at the earlier ages in males. We do not know to what extent the companies' actuaries have modified the bases of their tables during this decennial period; but it is probable that most of them have used without question the "English life tables," issued by the Registrar-General ten years ago. In that case, most persons who are insured have for some time been paying too much, and should expect the return, in one form or another, of some part of their premiums. In the following table we show how many years the average man at certain age periods may still expect to live, and how the expectation has increased for these ages since 1838:

	Expectation of Life.		
	1838-54.	1871-80.	1881-90.
At 15 years.	43.18	43.41	44.47
At 21 years	38.80	38.64	39.46
At 25 years	36.12	35.68	36.28
At 30 years	32.76	32.10	32.52
At 35 years	29.40	28.64	28.91
At 40 years	26.06	25.30	25.42

If this computation is begun at birth it shows 39.91 years to have been the average expectation in the first period, 41.35 years in the second, and 43.66 in the third. It is curious to find that in nearing the great age of 100 the expectation of reaching it is not so great as it was. An old man touching his 98th birthday might expect between 1838 and 1854 to live for a year and eleven months odd; nowadays he must make shift with the likelihood of a year and five months.

The simplest way of stating this improvement is to say that during the ten years we have saved 2,192 lives annually in each million of the English population. Of this number 189 were saved from small-pox, 382 from scarlet fever, 261 from diarrhœal diseases, 392 from phthisis, 197 from diseases of the nervous system, 170 from diseases of the respiratory system, 126 from enteric fever, 85 from violence, 78 from continued fever, 62 from whooping-cough, 61 from digestive ailments, and 43 from typhus. On these and other diseases there was, in fact, a yearly saving of 2,758 lives per million; but as a set off, 566 more lives per million were lost to diseases of the circulatory system (237), to cancer (121), to diseases of the urinary system (85), to measles (62), to diphtheria (42), and to diabetes (19). As demonstrating the comparative healthiness of town and country, a further table is of great interest. It shows the death-rates per million persons living:

	All causes.	Measles	Scarlet fever.	Whooping cough.	Diarrhœa.
28 Chief Towns .	21,505	626	403	612	890
50 Small Towns..	19,733	496	387	419	727
Rural England. .	17,634	329	286	366	520

The counties exhibit considerable differences. For examples, the annual measles rate was but 133 per million in Westmorland, yet it reached 709 in Lancashire. The rate for scarlet fever, only 99 in Suffolk, amounted to 533 in the West Riding. In 1871-80 Durham had shown the highest mortality from this disease, losing 1,376 lives per million to it; while Northumberland had lost 1,145, and Lancashire 1,126. Diphtheria, which is not included in the above table, destroyed every year 168 lives per million in urban, and 159 in rural England, no great difference; yet the rate was 82 in Durham, 85 in Cumberland, and 88 in the East Riding, while in London, Essex, and Middlesex, it was over 260. Whooping-cough did least mischief in Westmorland, with a death-rate of 193 per million, and most in Lancashire and London, with 520 and 690 deaths per million respectively. Typhus lingers longest in certain manufacturing areas of Cheshire, Lancashire, Durham, and Northumberland; in Westmorland it has not been heard of as a cause of death since 1880, and in twenty-three other counties it has not been accountable for more than five deaths in the million annually. Enteric fever still works much havoc in the North Riding, Lancashire, Notts, and Durham; and it is worthy of record that in the chief manufacturing centres it kills more men than women.

The case of cancer is also peculiar. There is, and has been for thirty years, a fairly well defined area of prevalence for it. This includes the districts of Stamford, Bourn, Spalding, and Holbeach, in Lincolnshire; Oundle and Peterborough, in Northants; and almost the entire counties of Huntingdon and Cambridge. The cancer death-rate has here averaged in the past decade 859 per million every year, while the rate for all England is 589 per million. To a large extent this is explained by the fact that they have a population which contains many more middle-aged people than the rest of the country, and cancer is chiefly confined to persons above 35 years. The cancer rate of Huntingdon is, to that of Durham, as 208 is to 100; but if they had populations of equal ages, it would only be as 127 to 100. Phthisis carried off on an annual average 1,724 persons per million; but in Northumberland it claimed 2,095, and in Worcestershire only 1,217. About this disease, which is prevalent chiefly because the public do not realize that consumption is equally infectious with many other diseases, though its effects are slow, the strangest fact is that in some counties it attacks men mostly and in others women. In London and five Southern or Midland counties, from 27 to 55 per cent. more men than women die of it; in South Wales, Durham, Lincolnshire, and the North Riding, the male deaths are from 12 to 21 per cent. the fewer.—*Yorkshire Post*, quoted by *Food and Sanitation.*

◆

PARIS—ITS SANITATION: ADMINISTRATIVE AND PRACTICAL.*

SEWAGE AND SEWERS.

THE sewer system of Paris is defective, and all attempts to remedy it cannot radically repair the initial errors. But the drawbacks can be diminished at the cost of heavy outlay, and the construction of powerful machinery. Paris has not a sufficient natural incline to run off its volume of daily detritus, and the sewers themselves, accepting their claimed absolute impermeability, suffer from being made the medium for gas mains, water pipes, and pneumatic tubes for the transmission of telegraphic post cards. The sewers were commenced before a supply of water was available to carry off the excreta of households; hence, fæcal matters fall into the branch drains, and have to remain there through lack of water to flush away the filth. No provision has been made for adequately carrying away the total outfall of the city sewage; part of it has been utilized for irrigating purposes, but the major quantity is discharged into the river Seine. Five centuries ago Parisians occupying a street subscribed to hire a cart in common to carry off the household filth that was thrown into the streets, and which had accumulated into little hills. It was removed and emptied elsewhere, close to a market place preferred, or into the river if nearer. It was to avoid the insupportable odors emanating from these deposits, that the mother of François I. selected in 1518, a site "in the country" on which to build a mansion, and that became later known as the Tuileries. This led to decrees in the end, which compelled citizens to pay taxes for the cleansing of the streets. One custom was difficult to suppress, the throwing of every kind of filth out of windows into the street; it was a practice peculiar to the tenants of mansions as well as of occupants of humble dwellings. Only before a vessel was emptied from a window, the warning "look out!" was to be uttered for the benefit of foot-passengers. It only ceased definitely in 1780. The plan—and to-day in vogue—of the dustman's cart with a bell going through the streets to collect kitchen detritis only, is three and a half centuries old. These precautions did not avert a succession of terrible plagues. In the Sixteenth Century, the Faculty of

---

* *Medical Press and Circular.*

Medicine was convoked to examine the causes of the epidemics; it was divided; some members were of opinion, the dirty streets were responsible, but other members laid the blame to the conjunction of Mars and Jupiter, and to comets with their tails turned toward the East. But not the less, all fæcal matters were run into the Seine at night, and in the morning the water carriers filled their buckets, for clients to utilize contents. Much the same thing exists still, for the suburban population of 600,000, who have only Seine water for all domestic purposes. The mud of Paris, was not only offensive for miles round, but it burned the stuffs that it gripped. There was an attempt made in the Sixteenth Century to lessen the capital's insalubrity by ordering that every house was to have a *fosse* or covered cesspool, into which fæcal matters were to be run. In time these tanks were cemented, and after a lapse of years it became compulsory to have a shaft conducting the deleterious gases above the chimney pots. This abominable system exists in all its glory still, and is one of the main causes of the impurity of the atmosphere of Paris. The English water-closet system became known at the close of the Eighteenth Century, it was a portable arrangement, a combination of a night-chair and a slop reservoir. Families when removing brought this apparatus away with them. But it was the germ of the system which now aims to convey all excreta into the public sewer by water flushings.

There are 88,843 houses in Paris, to accommodate nearly 2,400,000 inhabitants. The kitchen refuse is emptied into a common box in the court-yard at nine o'clock in the evening, and the *concierge*, or house-porter, transports every morning regularly that box to the street for the passing dustmen to empty into their carts. This part of the cleansing programme is executed by contractors for two million of francs yearly. The refuse is mostly emptied into barges, and conveyed to Corbeil and Pontoise for small farmers and kitchen gardeners down the river. The railways have special trains also, to transport the stuff, which sells at one franc the ton, to farmers who require it. But the wagons must start three hours after being filled from the carts. Except from outlying districts of the city, this stuff does not include street sweepings. The latter are swept into the kennels, that have mouths at fixed distances communicating with the main sewers; the kennel is swept, and an abundant quantity of water turned on to flush both kennel and sewer. About three o'clock in the morning scavengers of both sexes commence to make the *toilette* of Paris, but the leading thoroughfares are kept constantly swept in the daytime, and especially so after rain, when the streets are ever most clean—in this matter London would do well to model after Paris. All scullery and rain water is piped directly down into the sewers; the penalty is very severe, for whoever will empty slops or liquids connected with industries into sewers by the kennel openings. Naturally the sewers exact profuse flushings, or their solid matters will accumulate, putrefy, and the deleterious gases will escape by their kennel overtures, and poison the city's atmosphere. That is just what exists now as it has always been. The dustmen remove daily about 1,200 to 1,500 cubic mètres of refuse daily, or 900,000 tons a year. The sewage is counted upon to remove 3,000 cubic mètres of excreta and street sweepings daily. But only a certain portion of fæcal matters is run into the sewers. Thus the 88,843 houses in Paris represent 139,527 *chutes* or falls for fæcal matters, 64,175 of these discharge into *fosses* or reservoirs built under the house; 16,353 are removable *fosses* in wooden barrels, or in metal; that is, empty receptacles to replace those filled; 34,653 are filtering cylinders called *tinettes*. These consist of a perforated cylinder inside a metal case, which allows the liquid fæcal matter to drain into the sewer, the solid excreta being transported to "manure factories." All the hospitals, hospices, &c., are more or less in direct communication with the sewers, though employing the other processes of cesspool emptying. There are only 10,934 *chutes communicating directly with the sewers;* and 637 houses have some of the remaining ten different systems of separating the solid and liquid fæces. In a word, only one pipe in eleven of the total 139,527 night-soil discharges, connect directly with the sewers! Yet, the Municipal Council is bound by law to have the sewage system of Paris completed by July, 1899, and thus save the Seine from being daily polluted with 380,000 cubic mètres of sewage at Asnières. The system of *fosses fixèes*, or permanent cesspools, or tanks in the cellar regions of a house dates from Louis XII. In 1867, the Prefect of Police authorized the plan of the separating tinettes, or *système diviseur*, as it is called. The first is abominable; at the fall of evening a steam engine pumps the contents of the obnoxious tank into huge tuns, which two horses cart away to La Villette, and another river depôt, into cistern barges to be transported to river-side cultivators. The stench during the pumping is not a whit less than what it continues to be for hours after the operation. The *tinettes*, by a fiction, are claimed to be hermetically closed, and so allow men to carry them to the drays in full daylight. This removal system is only a few degrees less repugnant and dangerous to health than the terrible night soil pump. The contents of the *tinettes* are conveyed to factories, heated, acted upon by sulphuric acid, and converted into sulphate of ammonia. When the wind blows from the north, all these factory odors pollute the atmosphere with a sickening, depressing charnel-house smell. The usual comedy is enacted; the authorities are discovering the offenders, &c., as if the twenty-four licensed *industriels*, could be suppressed. At Bondy, the sewage is emptied over special areas, allowed to dry, and then mixed with charcoal dust, and ground into *poudrette.* Perhaps not one-fourth of the fæcal matters of Paris are discharged into the sewers. The Seine too often unfortunately forms the main cloaca. About 1830, France had 23,000 mètres of sewers, all nearly arched over. The total length of sewers *in* Paris is 939,129 mètres; unlike the sewers of London and Brussels, they have not a flow of water to flush away sediment; perhaps such a volume of water could not be employed, as the sewers perform also the duty for gas, telegraphic pipes, electric tubing, &c.

To Belgrand belongs the honor to have planned and commenced the existing system of sewers. When he died in 1878, he had completed 600 kilométres of sewers; he divided the city into several basins, comprising three grand collectors or main sewers, two on the right, and one on the left of the river. Then there was a series of secondary mains, and embracing fourteen different types; he estimated the total length of sewers at 1,040 kilométres or 712 miles, to carry off all city excreta, rain water, &c., and convey it outside the city to a point below the maximum flood level of the Seine, and so relieve the lower part of the river sides from inundation. In several of the branch sewers or galleries there only runs a rivulet of water; in some there is none at all, so the accumulated *detritus*, black and putrid, becomes a fit breeding centre of disease spores. Ordinarily, sewage refuse takes six hours to arrive at the Clichy collector—the terminus, while the carcase of an animal may require eighteen days to reach the same ending. The great obstacle to the working of the sewers is the accumulation of sand or silt; to lessen this drawback large iron cages, perforated in their superior part, are placed under the mouth of a sewer to strain and retain the flowing of sand—due to street sweepings chiefly straw, &c. These cages are drawn through special man-holes on the city side paths, emptied, and in due course carted away. It costs 20 francs per mètre cube to extract this sewage sand. The height of the largest sewage is 16½ feet, and the width 17 feet. The shape is that of an egg, the narrow point forming a gullet to induce rapidity of flow, and a border on which to walk. The height of the Seine above the level of the sea at Paris is 78 feet, so the natural incline for the sewers cannot be made very sharp. Indeed, this necessitates forming dams in the sewers, to well up the sludge, and then open them as if a lock to secure a scour. Further to induce a current, there are flat boats fitted with a sluice, or *vanne* arrangement to create a current when the flushing water is sluggish or insufficient. The mean temperature of Paris is 12.4°C., of the river 12.9°, and of the sewers 13.5°. The annual average of rain-fall in Paris is 40 millimètres. Of the three grand *collecteurs* or main sewers; the first, on the north, drains a city surface of 1,147 hectares—2½ acres equal one hectare—and empties it into the Seine at the Plaine St Denis; the second drains 3,545 hectares on the left of the river, including the quarters of St. Germain, St. Michel, Grenelle, &c., and takes in the little river Bièvre—once a chief open sewer. It passes under the Seine in two metal tubes, near the Pont d'Alma. The "Berlin" tube is to assist the collector. The third *ègôut collecteur* is at Asnières, and drains a surface of 2,526 hectares, and includes the Louvre, Boulevard Sébastopol, &c. The second and third collectors unite in a common collector at Clichy, these emptying into the Seine 763 cubic mètres of sewage, which the river carries to the populations further on to drink! (This curious fact not a little astonished the British sanitary inspectors when they held their annual Congress in Paris some years ago. At Gennevilliers, after inspecting some of the irrigation fields, we came to a small pool and were told that this was drinkable water; a glass was handed to Sir Benjamin Ward Richardson, their eminent and distinguished President; the taste was insipid, but not the slighest smell whatsoever prevailed. This, indeed, was an extraordinary miracle; at one end in Paris this very same water was black and repulsive in every way, and five miles further it was fully drinkable! The transformation was entirely due to its subterranean passage and nothing else.) At Clichy-Levallois a portion of the sewage is pumped up for irrigating the waste land of Gennevilliers, of which more anon. At Clichy, where anything but the "bright waters meet," the surface of the river is covered with "eyes" or bubbles filled with carburetted oa sulphuretted hydrogen; the sludge as it lazily flows away, depositing a black and rank alluvium along its banks, till it reaches Melum, when the Seine gradually recovers the same degree of clearness as when it entered Paris after its junction with the Marne. The sewage of Paris deepens yearly more and more in impurity. Docteur Miquel will almost attest it contains *every form of bacilli.*

◆

CAUSES LEADING TO TUBERCULAR INFECTION.

Of all the maladies to which human flesh is heir, none is so widespread in its ravages as tuberculosis of the lungs, or consumption. It is the "great white plague" of modern civilization. About one-fourth of the deaths from septic diseases in the United States result from it. Wherever civilized communities are found, and human beings remain settled in one place for any length of time, there the infectious microbe which causes this disease finds it way. It settles in towns and scattered villages; and even the old farm-house, with its pleasant associations, may be the shelter of this terrible plague, one generation after another of its successive inhabitants falling victims to the deadly legacy bequeathed to them by former inhabitants. Mankind dread the small-pox, the cholera, and the leprosy, but none of these diseases are more surely contagious than tuberculosis. It has become almost a household disease in many communities, and thousands of families throughout the country have their tubercular member, who is endangering the health of the others in the household. It is very important that people in general should know how to care properly for the patient thus afflicted, and also how to save his friends and relatives from infection.

The disease germs are taken into the body by breathing infected air and eating infected food. The air most frequently becomes infected from dust in which is mixed the dried sputum of consumptives. In every community there are many such patients who go on from year to year coughing and expectorating wherever they happen to be. This sputum dries, and is broken up into fine particles, which rise whenever the dust is disturbed, and are breathed into the lungs of all who may come within its reach. Thus does the tubercular patient infect not only his friends, but re-infects himself.

It is in this way that so much of so-called hereditary consumption occurs. The father or mother, perhaps many years ill with consumption, leaves behind a family of consumptives to die one after another prematurely; and the friends say, "O yes, it is sad that the family should all die so young, but you know it was hereditary, and it could not be helped."

It is a very rare occurrence for a child to be born tubercular, even when the parents are so, although many come into the world with a strong tendency in that direction; that is, they do not resist the disease well, and when exposed to the infection easily become diseased.

Such children are apt to become very rapidly infected during the first year of life, and especially during the second, third, and fourth years. After they begin to play on the floor, they are almost continually in the dust-laden air. The little child naturally puts everything into its mouth; and when it drops its toys or anything it has in its hand on the floor, it picks it up and puts it, all dust-laden, back into its mouth. If this dust happens to be full of dried and pulverized tubercular sputum, as it is apt to be in the home of the careless consumptive, the little one swallows the poison, and being already predisposed to the disease, it readily becomes infected with it. Thus the parent not only bequeaths to the child a tendency to the disease, but carelessly surrounds it with an atmosphere of disease germs, when a little care and painstaking might easily have spared the little one this danger to life. The tubercular germ, when dried, will retain its vitality for many months, and be ready for development whenever it finds a suitable soil.

Animals coming in contact with mankind take this infection from them. Cattle are very susceptible to this kind of contagion. Many herds, especially in the Eastern States, have cows among them which are infected with the disease, and give milk containing tubercular bacilli. It has been estimated that fully one-third of the cows which furnish our larger cities with milk are tubercular. All the milk from a dairy being mixed together in the large cans used for transporting it to market, the whole becomes infected; and it is from this supply that the poor babies of the great cities are compelled to take their food. No wonder that so many die young of tuberculosis. Children are also often infected early in life by nursing a tubercular mother or wet nurse.

Tuberculosis in adults is most frequent in the lungs, but infants and children are often infected in the glands of the neck, the membranes of the brain and of the bowels, and even in the structure of the bones. In fact, at no age is there any membrane, gland, or other organ of the body, but is liable to become infected with the tubercular virus. The fact that in adult life the infection of the lungs is so much more frequent than that of the other organs, would seem to indicate that the disease was most usually due to inhaling the germs.

Besides the frequent infection of the dwelling-houses of the land with tubercular microbes, all the dust of our cities, towns, and villages is more or less germ-laden. It is made up of dry expectorations, with the desiccated excreta of animals, and other filth. So full of poison is the air in New York City that living bacilli have been found in many healthy persons who had been killed by an accident, also in others who had died from other diseases, and had apparently sound lungs. In these cases the microscope revealed living germs in the bronchial glands, taken in with the impure inhalations of the infected air which they were compelled to breathe. In every street-car, omnibus, railroad, or other public conveyance, the careless expectorater leaves the seeds of disease.

The tubercular germ, fortunately, does not increase outside the bodies of men or animals; and when exposed to sunlight and moisture, its infecting properties are soon destroyed. When it is kept dry, and in darkness, however, neither heat nor cold seem to affect its vitality.

While this germ is always the source of the disease, there are certain causes which predispose to it, or fit the body for the germ to grow in it. Whatever tends to impair nutrition so weakens the structures of the body that the glands of the lungs and other organs soon become invaded. The great majority of cases of consumption and other tubercular disorders are preceded by disease of the digestive organs. The patient's general health failing because the digestive organs do imperfect work, all the cells and tissues of the body become enfeebled, and unable to destroy the disease germs which may find an entrance into the body. As we have seen, tubercular germs find their way either through the air or the food into the body. If the structures are healthy, these germs are soon destroyed, but if weakened by disease, the germs grow and multiply, until in time the body is destroyed.

Bottle-fed babies are often infected because they are poorly nourished. The mucous membranes lining the intestines become congested, and denuded of the epithelium, forming a diseased surface on which the bacilli, which are taken in in the milk or in other ways, lodge, and from this source infect all the mesenteric glands. Then the child has what is called consumption of the bowels; or the poison may infect the blood or the bones, the membranes of the brain, or the glands of the neck. These germs also sometimes lodge in the enlarged open ducts of the glands which fill the tonsils and other parts of the throat. Neglected running ears are another very frequent source of infection of these glands. Such children are said to be scrofulous, and to have inherited bad blood. The nose is liable to prove another source of infection to the glands. The inside lining membrane, becoming denuded from oft-repeated colds furnishes a most excellent place of lodgment for the germs.

In small children a cold on the lungs, or more correctly speaking, an attack of bronchitis, may result in catarrhal pneumonia. Many of the lung cells become filled with discharges, and collapse. Scars are left in the lung substance, in which the tissues are greatly weakened. If tubercular germs are taken into the lungs, they find these weak spots, and at once begin to grow, forming what is called tubercles, or the little round, hardened masses found in the lung tissue of tubercular patients. Measles, whooping-cough and scarlet fever are often followed by consumption in children and young people. These diseases leave the lungs weak, and the lining of the air passages congested and irritated, and the germs of consumption, breathed in with the air soon increase in numbers, and begin their work of destruction in the lung tissues already enfeebled from disease. Indeed, croupous pneumonia, typhoid fever, malarial fever, rheumatism, and all the other acute diseases which enfeeble the bodily tissues of either children or adults, predispose and prepare the lungs for tubercular attacks.

All chronic diseases, as valvular heart disease, Bright's disease of the kidneys, disease of the liver, and ailments of the digestive organs, are predisposing causes of tuberculosis. Intemperance both in eating and in the use of stimulants is also a very active agent in bringing about conditions conducive to this disease. Among the lower classes of the large cities, where intemperance, licentiousness, and kindred vices prevail, consumption of the lungs is a very common disorder; and poverty and want furnish most favorable conditions for the spread of the infection.

Overwork and want of sleep, sedentary occupations, and living and working in badly ventilated shops, factories, and stores, where successive generations of consumptives have worked and expectorated on the floors, and the buildings have become thoroughly infected with the tubercular bacilli, are all conducive to the disease. In many of the cotton factories of New England's large manufacturing cities, the operatives almost all sooner or later die of consumption. Entire families sometimes become extinct from its ravages. In the grinding and polishing of the steel instruments and utensils made in cutlery and other steel factories, the danger of infection is still further increased, the lungs being constantly irritated and congested by the gritty particles inhaled, and the operatives always cough more or less to get rid of them. This irritated condition of the mucous surface forms a favorable soil for receiving the tubercular germs, one in which there is no danger of a failure in the crop. The life of those operatives is usually terminated in the early thirties by what is called grinder's consumption. Strange as it may seem, the workers at these death-dealing employments at first refused to have anything done to make their work less dangerous, fearing that it might lead to the reduction of their wages from increased competition. Stone-cutting and working in flouring mills are also occupations more or less favorable for the development of consumption, as is also all sedentary work like that of book-keepers, type-writers, seamstresses, and other workers who sit or stand in one position for many hours of the day in close rooms, shut out from the sunlight and fresh air.

Close confinement in prisons and nunneries tends to breed tubercular disease. It is often very prevalent in badly built prisons, and is the disease from which the greatest number of the sisters in convents die. Churches, theater buildings, lecture-halls, and club-rooms that have been used for many years, and are shut away from the sunlight, being seldom properly ventilated, furnish excellent hiding-places for tubercular and other disease germs. Usually as soon as the congregation leaves, the janitor shuts up the building with the greatest care, as if to keep in all impure air, and preserve all the germs that have come in with the congregation. The dust of the dance-hall, where the gay revelers meet to dance away the precious hours of life, is often filled with these deadly germs. The beauty of the ball goes home with an irritated sore throat; and in a few months we hear that her physician has ordered a change of climate, for it is feared that she is going into a decline. The late hours, indigestible suppers, unhealthful dress, and fashionable dissipation have all paved the way for the germs to find a lodgment in her respiratory organs, and it may baffle the skill of the wisest of the medical profession, with the help of all appliances known to this progressive nineteenth century, to prevent their work of destruction.

Physicians and nurses often receive the infection from the patients they are called upon to care for professionally. Especially is the nurse in a consumptive's family exposed to the danger of contagion. The patient may have been long ill when she takes charge of the case, and may be but one of several members of the same family who have successively died of tubercular disease. The whole house may be infected when the nurse comes into it; and though she may do her best to destroy the infecting material, and to keep her patient from still further infecting the surroundings, the indifference and carelessness of the family as to the danger of contagion may overthrow the results of all her efforts. The patient may also fail to be careful in relation to the sputum, thinking it unnecessary to carry out the admonitions of the nurse to expectorate only into some prepared receptacle, which will render possible the complete destruction of the sputum. It is often very discouraging to get along with such patients, and to find that they defy all instructions in the matter, and take such a course as not only to lessen their own chances of recovery, but to endanger the lives of others. It requires much grace for a nurse to risk her life in caring for such persons.

During the past half-decade many cases of tubercular disease have begun after the debilitation due to the influenza, or la grippe. The pneumonia which so often complicates this disease leaves portions of the lungs consolidated, and at these points the tubercular germs readily find a starting-point, and soon there is a breaking-down of the tissue, and an abscess is formed. This is the history of many cases met with in general practice. Mothers debilitated by too frequent child-bearing, or over-worked when nursing their children, are very frequent victims of consumption. The overtaxation and persistent application to business practised by so many men in the pursuit of wealth often undermines the health, and invites an attack of the disease.

But while all these conditions predispose to tuberculosis, the disease cannot really exist without the germ which produces it. The ability to resist the disease is in proportion to the integrity and soundness of every tissue and organ of the body; therefore, whatever operates to destroy and lessen the number of germs in air, food, and drink, and whatever leads to the promotion of general good health, will tend to finally stamp out this great white plague, consumption.—*Good Health.*

THE DISPOSAL OF TOWN REFUSE.

ONE of the standing difficulties of all town sanitary authorities is the disposal of refuse, and the larger the town the greater the difficulty. Probably few people have any conception of the enormous quantity of dust which is year by year collected, and has by some means or another to be disposed of. From a report made to the County Council a couple of years ago, it appears that not far short of 900,000 tons is collected in London during the year, and as London increases in size not only does the distance which it has to be carried grow longer, but suburban residents grow more particular than they used to be, and object to their select neighborhoods being used as dumping grounds for other people's rubbish, so that the difficulty of disposing of it constantly increases. Every year then the necessity for destroying it on the spot becomes more urgent, and it is matter for no small surprise that the sanitary authorities of the metropolis are so slow in taking measures for its destruction by fire, as is so commonly done in provincial towns, where from their much smaller size the necessity for such a proceeding would seem infinitely less urgent than it is in London. The objections are partly the expense of land (the expense of the actual cremation is certainly no greater than that of carting the stuff away), and partly the fear of creating nuisance in carrying out the process. The fact is that the use of destructors has got for itself a somewhat bad name in consequence of the very imperfect furnaces which were at first used for the purpose; but we should have to think far more lightly than we now do of the mechanical ingenuity of the age in which we live before we could believe that the wit of man could not devise a means of burning up this mass of rubbish on the spot without producing a nuisance. The production of smell and the emission of dust are entirely the result of deficient combustion, and too great hurry in the process. But the evidence collected for the guidance of the County Council and the improvements which have even since then been made in the machines, as shown in the proposals made by Dr. Macadam before the Scottish Society of Arts, make it clear that all nuisance can be avoided, and it is to be hoped that before long the London authorities will seriously undertake this most necessary duty of burning up the refuse of the town directly it is collected from the houses, as is done in so many provincial towns.—*The Hospital.*

MARGARINE AND DECEPTION.

SOME of the most curious facts elicited by the recent Select Committee on Adulteration had reference to the trade in margarine. Properly prepared margarine is a perfectly healthy article of diet. It may not be quite as nice as good butter, but it is far better, and nicer also, than a great deal of the butter in the market; yet every effort is made to palm it off as butter, and not only so, but it appears that even people who know well what they are buying, who have not the slightest objection to margarine—in fact, want it—still dislike to have it labelled as such, or even to ask for it under its proper name. The report says: "The desire of purchasers to conceal from other customers the fact that they buy this article instead of butter induces them to abstain from asking for margarine under that name, and to demand butter at a low price." Such is pride! A sort of new language is invented, and it is recognized and understood that a request for butter at a certain price means margarine. And so to save the feelings of the British housewife the shopkeeper lays himself open to a charge under the Margarine Acts. There can be no doubt, however, that a large amount of fraudulent substitution of margarine for butter goes on. It appears that it is the custom to put up margarine in boxes and other receptacles of a shape similar to those in which butter is sent to market, and that every known form of butter package is imitated by the manufacturers of margarine, although considerable expense in addition to the increased cost of carriage is thereby involved; and the only object of all this must be to facilitate its fraudulent substitution for butter. It seems a pity that the trade in a perfectly wholesome food like margarine should be so surrounded by deceit that even the buyers if not cheated, like to cheat themselves and pretend to be buying butter. How is the law to protect people who not only submit to adulteration but are parties to the fraud?—*The Hospital.*

◆

DIETETIC VALUE OF CHEESE.

The minds of agriculturists have of late been greatly exercised to find some explanation for the depression in the Cheshire and Cheddar cheese trades. From the remarks of the Duke of Westminster at the Cheshire Dairy Farmers' Association it would appear that the lessened consumption of this, at one time, popular article of diet is due in great measure to a growing belief that it is inferior as a nutritive agent to tinned meats, and that this view is held by medical men. The assumption, we are convinced, is by no means correct, and from analyses conducted on behalf of the *Medical Press and Circular* we are in a position to state that Cheddar cheese of British manufacture contains a much higher percentage both of flesh-forming substances and of fats than meat, even of the finest quality. This view was held by no less an authority than the late Doctor Parkes, of Netley, who persistently maintained that as cheese contained a very large amount of albuminoid material in a very small bulk it was one of the best foods for soldiers in time of war. Doctor Thudichum, in his recent work, The Spirit of Cookery, states that cheese "is the most valuable animal food obtainable," and that it is "from two to three times as nutritious as the same money-value of ordinary meat." With the purely agricultural aspect of the subject we are not directly concerned, but it is our duty to point out that the argument frequently adduced that Cheddar cheese is less nutritious than meat is based on an entirely erroneous assumption.—*Medical Press and Circular.*

Department of Physical Education,

WITH SPECIAL REGARD TO THE SYMMETRICAL DEVELOPMENT OF THE BODY

Edited by J. CLARK SLAY, M.D.

DIVERSITY IN EXERCISE.

THE frequent varying of one's form of exercise, or labor, so that all parts of the body may become equally developed is a matter of very great importance for the symmetry, strength and health of the individual.

Should any particular limb or group of muscles be habitually called into action, while others are allowed to remain in a state of comparative rest, it will acquire a disproportionate degree of development and strength, by which the symmetry of the body is destroyed, its vigor impaired and the foundation for disease is often laid.

The tendency of partial exercise to produce an unequal growth of the body is to a certain extent shown in almost every individual. The limbs of the right side being those most constantly called into action acquire, in general, a marked superiority of development and strength over those of the left. In certain workmen this unequal development is exhibited to a much greater extent than in others. Thus the muscles of the arms of the blacksmith, the weaver and many others will be found in the majority of instances to be much larger and possessed of greater strength than those of the lower extremities. An old writer on gymnastics pointed out the fact here alluded to in a very forcible manner. Referring to the watermen, engaged almost constantly in rowing on the Thames, he observed : "From the partial manner in which their limbs are necessarily exerted their figures become ungraceful in the extreme; the chest is broad, it is true, but the shoulders are high and square; the neck thick and short, and the back rounded, giving the appearance of a stoop in consequence of the great size of the muscles upon the shoulders and upper part of the back, while the lower half of the body would seem absolutely emaciated. Their chest and arms are almost Herculean, while their legs are miserably small."

This form of development, while it gives precisely that degree of strength requisite for the mere handling of the oar, and for certain other mechanical employments, to say nothing of its deformity, almost entirely incapacitates its possessor for any occupation in which the feet and legs are actively engaged. A contrast to these oarsmen is often exhibited in the professional pedestrian, in whom the legs are large and strong and the upper parts of the body disproportionately small and weak.

Physical exercise consists strictly in the alternate flexion and extension of the limbs, or in the quick succession of muscular contraction and relaxation. Permanent contraction or extension of the muscles for a long time produces scarcely any of the beneficial effects which are to be expected from proper exercise. Notwithstanding that numerous groups of muscles are brought into action while the individual is sitting or standing, in neither position can the body be said to be in exercise. The workman, who in a standing position, exerts chiefly the muscles of the arms, receives only partial exercise. It is true, he avoids the strained position of the body assumed by the mechanic who works sitting, but as regards exercise he has but little advantage over the latter. It is for this reason that walking as a means of recreation or exercise is admirably adapted to almost every individual of the indoor working classes for it tends to produce an equal degree of development in the lower parts of the body with that which is produced in the upper parts by their daily vocations. On the other hand, those who are obliged to walk, or in any other manner exert their lower extremities for the greater part of the day, will find in certain mechanical employments or exercises in which the arms are chiefly engaged, while the rest of the body is allowed to remain in a state of comparative rest, the exercise required to balance the effects of that which they are ordinarily subjected. The above circumstances should be borne in mind even when resorting to exercise for amusement. The following advice from an old writer exhibits much good sense:

"Your amusements should be adapted to the nature of your employment through the day, thus should you be exhausted by toil, choose some amusement in which skill and dexterity are required rather than labor; but if your employment in the day should have been accompanied with but little exertion, choose those sports which call the various muscles into play. Take care, however, that your amusements or your sports bear not on the limbs which work has wearied. Let him whose arms are fatigued with wielding the pickaxe or the ponderous hammer amuse himself when his task is over with a rural walk, while he, whose occupation wearies his legs and feet, should rather seek amusement in those sports in which the arms are chiefly concerned."

THE RELATION OF EXERCISE TO HEALTH.

By Albert H. Olmstead.

Superintendent Male Hydro-Therapeutic Department, Alma Sanitarium, Alma, Mich.

In all the broad realms of Nature there do not exist better or wiser adaptation of means to ends than those exhibited in the arrangements of the human system for its general well-being and the maintenance in perfect health of all its functions. The human system could scarcely be constructed on any other plan with the twofold object of its safety and perpetuity in contemplation. That all may have, to a certain and sufficient extent, the control of their own physical systems can hardly be denied. The acknowledgment of this fact places the responsibility for one's health, efficiency, and happiness upon individual shoulders, where every one should feel that it belongs; for upon this conclusion the responsibility for human action is based. The moral and intellectual natures of man have ever been regarded as fit subjects for training and development, the physical system is manifestly a subject for corresponding attention, and that it should be a subject for first consideration would seem to be indicated by the fact that the physical is prior in the order of development, not only as respects the individual, who is through this animal body, fitted for his career as an intellectual being, but also in the progressive development of the human race.

Physical culture then should be promoted, both scientifically and as an art, in all the numerous applications of which it is susceptible, until it gains that high position in the individual and public esteem commensurate with its importance. The particular forms it shall take, and the methods by which it shall be applied, are as yet in a stage of experimental investigation, each person giving the matter any considerable attention, contributing something of his own thought and experience toward the realization of the great object in view, namely, the highest efficiency and well-being of mankind, physical and moral. In its present embryonic state, the subject is one concerning which an abundance of vague and glittering generalities are expressed, but only a few practical precepts or definite directions are given.

The feeble person and the invalid are constantly advised to take exercise. Physicians, friends and books unite in confirming the dictations of his own common sense in this respect, but the anxious inquirer looks often in vain to all these sources for any definite or satisfactory information based on physiology and the laws of life which shall tell him how the remedy operates, and also how it should be applied. And yet the theory that exercise is intimately and inseparably connected with good health is no new one. The first instance of the employment of movements as a physiological agency of which we have any account in history, was by the Chinese, 2,698 years before the Christian era, they had an elaborate system called the Cong Fou, the principle of which was that the mechanism of the body being entirely hydraulic, with a free circulation of the fluids, health consists only with a proper equipoise of these fluids in their reciprocal relations, and to restore health this equilibrium must be established. The method of application of the Cong Fou was to place the body in different attitudes, sometimes with weights imposed, and by exercising the respiratory function in various ways, increase the circulation of the blood and stimulate the digestive process.

The ancient Greeks, those famed of the Seven Hundred Olympiads, employed scientifically directed exercise in the severe training required to fit them to enter the contests. In the palmy days of the Roman Empire, thousands of slaves were required to attend the patrons of renowned Caracalla, and the gladiator was trained something after the manner of the modern pugilist. During the Dark Ages we have no record of the employment of these external agencies for the promotion of health.

Coming to the present century, we find the subject begins to receive more consideration. Louis Ling, a professor of fencing in the University of Stockholm in 1805, elaborated so thorough a system of physical exercises that he was knighted by his sovereign and a government appropriation was secured, enabling him to establish an institute where his methods could be taught. These are practically the foundation of all that is comprehended to-day under the various terms of physical culture, calisthenics, gymnastics, Delsarte, Swedish Movements, massage, etc. The underlying principles of Ling's methods are in many respects allied to the Chinese Cong Fou. The relations of chemical and molecular changes to the origin of force in the body, the correlation of mechanical and nervous forces, the forces as a product of vital action, are all given due consideration. The incessant chemical action by which the organic tissues of the body are undergoing constant change, implies motion. By motion all vital phenomena are accomplished.

Among many definitions of movements, we will give Ling's. A movement is a product of life and is impressed with its essence. The natural interior, invisible action which unceasingly creates the vital forces, which at the same time engenders other exterior, visible vital manifestations. It is that by which the united organic individual manifests its intellectual and moral, physical and chemical life, whereby life is developed, maintained, deteriorated, repaired, or resolved into its elements.

In summing up the importance of scientifically directed exercise, we will enumerate these few facts. Nutrition or muscular development of any part of the body occurs in direct relation with the active movements to which the part has been subjected. Increased respiration occurs simultaneously with every muscular effort. It promotes a renewal of blood in the capillaries with the effect of increased secretion. Muscular action powerfully urges the blood into the skin and lungs, the two principle excretory organs, whence the excretory product of the body is readily eliminated. It promotes absorption by more readily taking up the nutritive substance of food after it has been reduced to a fluid state by the digestive process. As to its effect upon the quality of the blood, all the above named processes, respiration, nutrition, secretion, absorption and excretion, are the means whereby the blood itself, the great fountain from which life is supplied to the whole body, is maintained in its purity and fitness for its several purposes. Its action on the digestive tract is a positive one. It is not enough to insert food into the stomach, it must be liquefied by the muscular action of the stomach and the digestive fluids. Otherwise it would be a source of direct injury from the fermentation and poisonous gases which would inevitably occur.

Pliny says the mind is stimulated by exercise. Galen says all the powers of the soul are increased and renewed by exercise. The greatest danger to health results from complete inactivity as the greatest benefit results from moderate exercise. Fatigue is in proportion to the amount of *mental* and *nervous*, rather than to the amount of muscular action employed. Exercise should not be entered into blindly or injudiciously, *but with the knowledge* of what is desired to be accomplished and the best means for that accomplishment. Persons in feeble health should diligently seek instruction on this point, which is as important and necessary as instruction regarding the taking of medicine.

THE NATIONAL NEED OF VITALITY AND POWER.

THE first object in view in the training of our children should be to make sure that the childhood and youth are spent in such a way as to best train the individual to face modern life. The great need is stronger and more enduring nervous systems, more vitality; therefore, we should see that our public schools make the conservation of vitality the matter of first concern. Our greatest hope with reference to increased vitality lies in a reformation of the ideals of our whole public school system. That which the children of cities need more than any one thing is vitality and power. They need to grow up to be whole, complete individuals, strong physically, and with enduring nervous systems, that have been trained by long-continued and vigorous muscular work; by hearty and whole-souled play; by outside air and sunshine, as well as by the more subjective work of text-book and class-room. Accordingly, the first thought with reference to the education of children should be this one with reference to the vigor and vitality of the pupil.

The kind of reformation of which I speak can only be accomplished by a clear comprehension of the fundamental nature of these subjects by the teachers, and the co-operation of all, from the school board down. It means that every teacher shall be concerned that every pupil sits well in the class-room, and stands well during recitation; that every class-room shall be thoroughly ventilated and lighted; that there shall be brief intervals utilized for deep breathing and such other exercises as can be well taken in the class-room. It means that there shall be connected with every school a suitable play-ground, and that there shall be systematic effort made to induce all the children to use these grounds with vigor and enthusiasm. If necessary, there might be arranged a course of games which should increasingly demand muscular effort and co-ordination, and thus the education of the neuro-muscular mechanism would come to be regarded as definitely a part of the object of the schools. Such attention to this subject is not impracticable; it is already done in some schools, particularly in England.

This does not necessarily mean less real progress with reference to any subject; and even if it should, the value of vitality must not be compared with anything else excepting character. Our first need is more power. With power the individual can do anything; without power he can do little. The reformation of our whole public school system, the dawn of which we are already seeing, is the first tangible step which we see with reference to the accomplishment of that which shall maintain our vitality, and which shall build up for our children nervous systems which can endure the stress of these times.

The second and only other great factor which I shall mention as looking to the remedy of the present situation is found in our changing conception of the nature of religion. Our divines are coming to see that upon the maintenance of physical vitality and health must be built the structure of character, and that the service of God includes what has been called the religion of the body; that the laws of God obtain as much in regard to the material as to the physical elements in our nature, and that it is as much a sin to be sick or weak as to do wicked things. We serve the cause of the world by being strong and living the full physical life as well as by being true and noble and living the full psychical and spiritual life. The service to our fellow men demands our whole selves. This changing consciousness in regard to the scope of religion we regard as one of the most hopeful signs of the times. If the day shall come, as I hope and believe it will come, when from every pulpit in the land there shall be preached the gospel of wholesomeness when the divine obligations of living in accord with the laws of our physical as well as with those of our psychical natures shall be recognized, then we shall with increasing obedience come into increasing life, both bodily and spiritual.

This step is, however, an intangible one, and must perhaps largely be left to work itself out; but toward the reformation of our public schools and the insistence that they shall place the vitality and power of the pupil as the first object to be concerned by education, let us bend every endeavor. In the election of our superintendents of education and of our school boards, and in proper pressure through the press, let us insist that this thing shall be put first; for unless we do—unless we succeed in securing stronger nervous systems than the world has to-day, the increased stress and strain of modern life will result increasingly in the various forms of nervousness, of decreased vitality, of failing power, of degeneration, and of consequent weakness and immorality, which are by many regarded as one of the characteristics of the age.—Luther Gulick, M. D., in *Physical Education.*

DANGERS OF BICYCLING; WITH REPORT OF A CASE OF ACUTE DILATATION OF THE HEART.

By William C. Krauss, M. D.

Professor of Nervous Diseases, Medical Department Niagara University, Buffalo, N. Y.

Ever since the great popularity which has attended bicycling in this country, numerous articles have appeared in the medical and lay press pointing out real and imaginary dangers liable to beset those attracted to this sport. These dangers have attended both sexes, more particularly the female bicyclists, and consisted in disturbances affecting the pelvic viscera. No doubt over-indulgence in this pastime can and will produce congestions and irritations of these organs, perhaps displacements and even inflammations, but such cases are comparatively rare.

From the moral point of view another danger has been discovered by the Woman's Rescue League of Washington: That the bicycle is nothing more or less than the devil's advance agent, and through the opportunities which it offers is causing an alarming increase of immorality among women. The writer believes this to be true only in so far as it affects those women upon whom the devil already has a mortgage, and employs the wheel only as a subterfuge to foreclose the claim. The wheel has been a great aid to physicians in the treatment of neurasthenic, hysteric, and hypochondriac women, and the good it has done to them and the pleasures derived from it by others will more than counterbalance the harm which those unable to ride think it has and may create. Pleasure and health can be derived from bicycling only so long as the laws of hygiene and common sense are heeded, and their violation will be followed by disagreeable consequences.

The male sex is predisposed to that ungainly and unhuman distortion, the "camel's back," as a result of faulty posture and ambition for speed, and perhaps fame. Not only is the spinal column strained and distorted, but the thoracic and abdominal viscera are subject to undue pressure, and hence to restricted movements and imperfect physiologic action. No sport is a healthy one which in its performance coerces the body into an unnatural position, and the great popularity attained by rowing and baseball is partly due to the comfort and pleasure which the normal position of the body insures.

Through long-continued pressure caused by long rides and faulty fitting saddles, the male genito-urinary tract is liable to damage, and this should therefore be carefully guarded against. The dangers which do arise, however, from bicycling affect the beginners, and scorchers mostly, who have not learned the secret of the sport, namely, moderation.

After consent is obtained from the family physician to ride, a properly geared wheel should be selected, with an easy and comfortably fitting saddle, the handle bar raised so as to give the body an erect and graceful position, and this advice constantly borne in mind, that the sport should be discontinued at the first sign of fatigue. As the days go by this fatigue will grow less and less, and the rider able to take longer spins as the muscles become firmer and more accustomed to this form of exercise. The whole system undergoes a certain kind of training or physical education, the heart and respiratory muscles accustoming themselves to the necessary strain just as do the extensors of the thighs and the calf muscles. Just as over-indulgence results in tiredness and lameness of the leg muscles, so also are the heart and respiratory muscles affected. The heart through increased work put upon it by long, rapid spins is taxed to its utmost, and when persevered in, serious damage to the heart walls or heart valves may result. As Osler truthfully says: "Endurance in prolonged contests is measured by the capabilities of the heart, and its essence consists in being able to meet the continuous tendency to overstep the limits of dilatation."

One form of heart trouble especially is attended upon over-exertion and over-fatigue, namely, the acute dilatation of the heart walls, due to over distension of the muscle fibers. The cause of this dilatation is an incomplete exhaustion of the ventricles, generally the right, during systole, and an excessive engorgement during diastole with possibly some defective nutritive change in the muscle fibers. The symptoms arising from this condition are subjective and objective, and are well illustrated in a case which recently came under my observation.

James H. C., age 37 years; height 5 feet 6 inches; weight 138 pounds; married and has eight children. He had an attack of rheumatism when twelve years of age, and typhoid fever when twenty-nine. Has always been a hard-working man, employed on the railroad, sometimes ten to fourteen hours daily. About May 1, 1896, he purchased a wheel and rode occasionally from his home to the railroad yards, perhaps a distance of half a mile. On May 8, 1896, he accompanied a few friends on a spin into the country and rode four miles in twenty-five minutes. On dismounting, he noticed a severe pain over the left side of the chest extending to the neck, also that he was completely "winded," and the left side of the chest was throbbing violently. After only a few minutes rest, urged by his friends, he remounted the wheel and rode home, covered the distance in thirty minutes. On reaching home he could scarcely breathe, was in profuse perspiration, trembled all over, and was obliged to go to bed. Vomited during the night; the following morning he found he was still in the same condition and was unable to go to work, and scarcely able to be on his feet. The least exertion caused his left side to "thump" vigorously, while the vessels in the neck throbbed so wildly as to make them perceptible. Patient also noticed a feeling of weakness all over the body and a stiffness of the knee joints, accompanied always with great dyspnœa.

After remaining idle for several weeks and not obtaining very much relief, he consulted me on July 20, 1896, for "weakness and trembling," thinking that he had some nervous disorder; he stated that his sickness began on May, 8, 1896; that he worked the day previous, and up to that day was in his usual good health.

Status Præsens.—Face has an anxious, apprehensive expression; eyes are glassy, and facial muscles quivering. Pallor and emaciation are pronounced. There is a slight tremor to the head; is not painful on percussion, and has never had headache.

The examination of the eyes was made by Dr. R. H. Satterlee, of Buffalo, N. Y. "Ophthalmoscope shows hyperopia; right eye 2 diopters; left eye 1 diopter. No astigmatism could be discovered. Both eyes have unsteady lateral movement. Left eye does not move as freely as right eye. Weakness of all eye muscles, particularly the interni. Accepts no glass at first; vision later after wearing R. + .50 D., L. + .25 D. for half an hour, 20 20. These prescribed to be worn two months constantly."

Strength of arms diminished; dynamometer test shows right hand 60, left, 40; tremulous, and with increased tendon and muscular reflex action. The legs, likewise, are weakened, also tremulous, and the reflexes are exaggerated. There is no anæsthesia or hyperæsthesia of the face, arms or legs.

The chest offers the most important symptoms, both objective and subjective. The precordial area is largely increased and reverberates with every heart-beat. The apex point is diffused and impossible to locate. On palpation a tremulous and purring sensation is experienced which is communicated to nearly the whole side of the thorax. Percussion shows increased area of cardiac dullness extending to the right of the sternum, to the left of the mammillary line and below the nipple. Auscultation does not reveal any valvular murmurs, although the sounds are indistinct and diffused. The heart-beats number 130 to 150 per minute.

Urine is increased in quantity, but does not contain albumin or sugar. Bowels are regular. Sleep is fair, but is often awakened by the heart's action. During the day he is aware of much fluttering of the heart while napping.

On July 27, 1896, I again had occasion to see the patient, and found his heart in practically the same condition, beating 130 times per minute, and as tumultuously as on the former examination.

The history of this case leaves little doubt as to the correctness of the diagnosis —acute dilatation, and the cause of such dilatation—over bicycling. The distance covered and the time would be insignificant to a trained wheelman, but to one not accustomed to long rides it was quite an undertaking and was fraught with serious consequences. In conversation with beginners in the sport one hears so often, "I rode eight or ten miles to-day in such a time," or "I rode a mile in such a time and have only been on the wheel a few days," and yet these riders may never have taken any kind of regular physical exercise. They certainly are imprudent and should be discouraged in their ambitious tendencies until they are in condition to endure the necessary strain. To the writer this seems one of the greatest dangers of bicycling, and yet one of the easiest to avoid.—*Journal American Medical Association.*

THE BICYCLE FOR RHEUMATISM.

RECURRENT attacks of acute inflammatory rheumatism, continued through many years, caused me to grow continually stiffer and clumsier. With the hope of retaining a reasonable use of my muscles, it was my habit to walk between my home and my place of occupation, a distance of nearly three miles. But the time arrived when I felt inclined to do but half the distance, and finally I did that with more or less inconvenience. I was fifty-five years of age, but knew that I was physically sound, and had not a doubt that I should be vigorous, but for rheumatism.

In July of the past year, my kind-hearted co-worker made to me what seemed the most ridiculous of all possible suggestions: he advised that I try riding a bicycle. Consider my age and my stiffened muscles, my inability to walk far with any comfort, and judge what my chances were to ride so crazy a vehicle as a bicycle, a born wobbler and dodger, a typical jolter even of sound bones and healthy muscles.

But however ridiculous the suggestion at first appeared, it was rational at its foundation. If only I could drink enough water daily, and free it, chiefly through the skin, there was much more than a hope of opening my choked-up sewers and eliminating the almost insoluble residues which stiffened my anatomy.

At the end of ten evenings spent at the bicycle school, I had taken but the usual five lessons, but I then moved to the asphalt the scene of my falls and bruises; and in due time I was at evening among the riders over the smooth roads of the park. Not only had I grown somewhat less clumsy and stiff, but from added enjoyment of life I judged that my health was actually better. Pleasurable exercise in the free air, with profuse perspiration, was accomplishing effects already beneficial. Moreover, I knew precisely how to pass the evenings until summer had gone, and my family had returned to the city.

The park course is one and a half miles in length—a level road around a lake. I rode there during evenings, rode and drank water and perspired profusely. As I grew stronger, greater distances were accomplished, until at the end of a month I easily and pleasurably would ride as many as ten miles within the usual two hours. After a bath, I slept the sleep of a tired child, and awoke refreshed and light-hearted. And best of all, I was getting the best of my enemy. Not once did I permit myself to ride until tired, or to attempt heavy hills, or to ride rapidly for short distances; neither did I attempt any of the tricks which sooner or later bring to grief riders both young and old.

At the end of ten weeks from my advent into the park, or about the middle of October, a friend and myself started from Newark, Delaware, to ride down the peninsula. We made thirty miles the first day, and fifty miles the second day, and by that time I knew that I had been on a bicycle. We made fifty miles on the third day, and I had another inspiration—I knew that I could ride fifty miles daily over a good road, with enjoyment of every hour of the time; and yet three months ago I was in effect a cripple who had no pleasure in walking even a single mile. Here was indeed a miracle!

It was our delayed summer holiday, and it proved as happy a one as either of us had ever enjoyed. One of us was regarded as an invalid, the other as a cripple, but we contrived to enjoy almost every one of the two hundred miles to Cape Charles. The sandy stretches were grateful when one fell from his perch, and we did not object to them.

During the past winter, there were but few days in which I could not ride to and from my work, a total distance of six and a half miles; and now I can walk with the best of them, and can and do enjoy riding as many miles as the average rider cares to make in the afternoon. I am not at all conscious of any rheumatism.—*L. A. W. Bulletin in Good Health.*

SOME RISK OF CYCLING.

A NOTE of warning as to the risk of cycling in wet and winter weather may not be out of place at the present moment. While it is true that those who are strong and hearty may enjoy it, and if they wear suitable garments and change their clothing at once on returning home will probably take no harm; it is by no means a practice to be encouraged in the case of weak and delicate persons for the exhaustion produced by hard work must leave a person of fragile physique very liable to contract colds or to develop rheumatic symptoms. The liability to such dangers is particularly great in the case of ladies, unless the dress worn is thoroughly well adapted to this form of exercise. A theory has been started to the effect that bicycling will tend to make a woman of the future acquire a squat figure through her devotion to the bicycle. There-may possibly be some truth in this suggestion if machines are not properly adjusted, and if the rider does not sit in a proper position. When these conditions are fulfilled, however, and the greatest importance ought to be attached to making the adjustments, it seems far more probable that the figure will gain in erectness and suppleness owing to the more perfect development of the muscles of the back, which are a weak place in so many young girls. These muscles are brought into constant action in the balancing of the body, and there does not seem to be any good reason to suppose that the development of the leg will outrun that of the rest of the body. At the same time, we are not indisposed to believe that a too exclusive devotion to cycling as a mode of exercise may have the effect of depreciating somewhat the grace of carriage and the general balance of development. Certainly it cannot altogether take the place of those games, such as lawn tennis, which have during the last twenty years had a most beneficial effect upon the health and development of the women in this country.—*British Medical Journal.*

DEEP BREATHING—WITH POINTS ON EXERCISE.

By Charles E. Page, M. D.
Boston.

Much has been written of late years about the importance of deep breathing; but generally speaking about all the advice given is for us to practice taking deep inspirations voluntarily, so many breaths, so and so, and so often during the day. This is to take a very narrow view of the matter, as it seems to me. Beyond question, deep breathing is very important; but the only practical and by all means best way to secure it is by doing something to compel it in a perfectly natural way. Hard, sharp muscular, all round exercise is the proper thing. Walking, running, rowing, swimming, hill or stair climbing, golf, tennis, baseball—anything, everything, that will engage all of the muscles of the body and keep them supple, fine, strong, and free from fatty degeneration. Attend sufficiently to these things, and no one will have to tell us how to breathe! The "machine runs itself" automatically, and all its functions, including that of breathing, will be performed in the most natural manner if we treat it naturally. Indeed, if we could and would always do this there would be no disease, no sickness, no excuse for drug-poisoning, and high health would everywhere prevail.

We may well take lessons from the lower animals who in some respects are above us, in that they live far nearer to nature, are more obedient to the laws of nature, which are the laws of God, if you please. This morning as I lay in bed—the bed, by the way, close to the wide open bay window, that I might have during all my hours in bed almost as fresh "night air" as the birds—I observed a little English sparrow's antics on the edge of the neighboring roof. He was not still even for a second of time, though he evidently had nothing to do but loaf. His head was in constant motion, up, down, to one side and then the other, his body moving with a wiggle, twist and turn, hop, skip, jump, a flutter of the wings, a bit of a flight—in brief, every movement was evidently a means of physical delight, as, indeed, it is and always will be with every living creature, man, woman, and child, who, through proper physical training, keeps himself healthy.

"When I reflect on the immunity of hard-working people from the effects of wrong and over-feeding," said that wonderfully wise physician, Dr. Beerhaave, "I cannot help thinking that most of our fashionable diseases might be cured *mechanically instead of chemically*, by climbing a bitter-wood or by chopping it down, if you like, rather than swallowing a decoction of its disgusting leaves!"—*Moody's Magazine of Medicine.*

ATHLETIC EXCESS.

A WISE critic says: Athletes who have overdeveloped certain sets of muscles at the expense of others, men who have acquired a stoop from constantly bending, people who have weakened the heart by violent exercise, should be criticized severely for making gymnastics a menace instead of a means to health. The impression they produce is most painful. A gymnast must show in his own body that he has benefited by his training in order for us to admire his cleverness. One is often inclined to disapprove altogether the idea of such exhibitions as degrading to the art of gymnastics. . . . Nothing so satisfies the æsthetic eye as a well-developed body, responding to the will in executing difficult movements and tests of strength. There is beauty in rounded limbs and youthful contours, but the beauty of a clean-cut muscular figure, evincing in every line strength and vigor, has a far more potent attraction than anything the disciples of Delsarte find admirable. Only when a gymnast can prove that he is an all-round athlete will the scientific physical trainer heartily approve of his giving exhibitions of his skill, for then he has attained harmonious physical culture, and shows himself as a model for others to imitate.

Nothing better could happen for the cause of legitimate physical education than to have the public taste cultivated to expect greater all-round perfection.—*Sel.*

MENTAL OVERSTRAIN IN EDUCATION.

DR. G. E. SHUTTLEWORTH at a recent meeting of the British Medical Association urged that in spite of much that had been written on the subject there was still evidence, in certain departments of education of overpressure resulting in mental overstrain. Briefly referring to true and false views of what education meant, and to the necessity of treating each pupil, not merely as a unit in the scheme, but as an individual possessing inherent—not to say inherited—peculiarities both of mind and body, he pointed out that "overpressure" was not an absolute quantity, but varied in relation to the personal factors in a given case. Adverting to past abuses, he expressed the opinion that the incidence of overpressure did not now fall, as was the case when Sir James Crichton Browne made his report some twelve years ago, especially upon the dull children in our elementary schools. Under the new code it was rather the bright children who were apt to suffer from abnormal nerve signs, chorea, etc., under the stimulus of examinations and inspections at which they were expected to maintain the reputation of their schools. Precocious children were often the offspring of neurotic parents, and such were apt to break down under any mental strain.

In secondary education, similarly, the incidence of mental overstrain was most felt in preparatory schools, and by young boys of promise, who were unhappily often sacrificed to the Moloch of competitive examination. In public schools and higher grade schools generally for boys, the systematic inclusion of outdoor games in the school routine was a great safeguard against overpressure. In high schools for girls, however, the risk of overstrain was much greater. There was seldom adequate provision of outdoor exercise and recreation, and, too frequently, there was an utter disregard by the school authorities of the physiological conditions of building womanhood. Girls were expected to learn all that eithers of corresponding age were taught, music and other feminine accomplishments being superaded. Could it be wondered at that considering the conscientiousness in preparation and the keen spirit of emulation displayed by girls, an overloaded curriculum too often eventuated in breakdown? There was more elasticity in the women's colleges than in the high school; but the strain of frequently recurring examinations often proved trying to those whose antecedents were neurotic.

The etiological factors conducing to mental overstrain were discussed, special reference being made to the predisposing influence of neurotic or tuberculous heredity, of malnutrition, and of menstrual irregularities, as well as to undue stimulation of brain cells.

Amongst symptoms denoting overstrain were noticed such as the following: In young children a wearied expression, with bagginess of lower eyelids, a want tonicity and balance in the muscular system, with twitchings, stammerings, jactitations, and chorea. In those approaching puberty, further indications of neurasthenia, appeared, such as aprosexia (inability to sustain attention), heterophemia (a tendency to answer wrong), neuralgia, sleeplessness or sopor, a general want of "pluck," and the condition which has been described as *anorexia scholastica.*

As regards treatment, prevention was better than cure; and nothing effectual could be done unless the patient were withdrawn from the conditions causing the overstrain. Then good bracing air, judicious exercise (such as tennis, rowing, or bicycling), diverting occupation, and suitable feeding were of importance; and care should be taken that no time was left for morbid introspection, for neurasthenia tended to melancholia. Ferruginous tonics were often very useful; and so were maltine and cod-liver oil, which would promote that comfortable condition of fatness which is, as a rule, closely allied with mental contentment.—*Charlotte Med. Journal.*

DISINFECTANTS, WHEN AND HOW TO USE THEM.

The first and most important thing to do after the physician has made his diagnosis of an infectious or contagious disease is to isolate the entire family, with the exception of the mother, who should assist the nurse. Send the young children away from the house at once. This will leave the house in charge of physician, nurse, and mother.

Every effort should be made to prevent infection of the room that is occupied by the patient. This can be readily prevented by removing all furniture that is not absolutely needed. Curtains, upholstered furniture, carpets, etc., should be removed from the room at once, and nothing should be used in the room that cannot be readily cleansed with the usual germicidal agents, which I shall mention later. It is folly to attempt disinfection of a room while it is occupied by a patient. This is often undertaken by using chlorid of lime, carbolic acid, etc., in vessels under the bed and in other parts of the room. It never should be forgotten that what is death to the bacteria may also prove fatal to the patient. The room should contain certain disinfectants in a large vessel in which to wash all the articles used by the patient. The vessel that receives the excreta should contain a powerful germicide, such as soluble chlorid of zinc, carbolic acid, lime, etc., so as to cause the death of the bacteria on entering the vessel. This is the only proper way of meeting the enemy and not, as is so often done, by pouring a solution upon the excreta after it has been in the vessel for a certain length of time. The excreta should be burned by dry heat and never thrown into a waste sink. A large sheet moistened with bichlorid solution twice daily should be hung across the doorway leading from the room, so as to kill all the germs likely to leave the room when the door is opened. The floors, walls, and all surfaces should be sprayed or washed daily with a germicide. The patient's wishes should be consulted as to the disinfectant most agreeable to him. This rule should never be disregarded.

The clothing worn by the patient should be burned, together with the mattress, and if the bed is of wood, it also should be burned. The walls, if papered, should be scraped and washed, and repapered. In large cities the boards of health are prepared to fumigate the furniture, etc., at a very trifling cost, and whenever possible, this should be recommended by the physician. The room should be thoroughly fumigated with sulphur, and I know of no better method than the one adopted by Miss Green, late of St. Timothy's Hospital, Philadelphia, and now of the Good Samaritan Hospital, Lebanon, Pa. Her mode of procedure is to cover all metallic surfaces which are likely to become tarnished, with a mixture of tallow, oil and whiting. Blankets and spreads should be hung on a line in the center of the room. Closets and drawers must be open, so that gas can penetrate to every corner and crevice. Have fireplace and ventilators closed as tight as possible. Paste strips of paper around the windows, doors, and all cracks, so that the gaseous vapor cannot escape, and all draught may be prevented. Use roll sulphur, and put it in cans or earthen jars, and place them in water or on bricks, so as not to burn the floor. Pour a small quantity of alcohol over the sulphur, and ignite the can at the farthest point from the door first, so as to inhale as little as possible of the poisonous fumes. Close the door, and paste strips of paper around it on the other side. Let the door be closed twenty-four hours, and ventilate thoroughly. The amount of sulphur required for a room twelve by thirty feet is five pounds.

Everything in the room should be washed with a two-per-cent. solution of carbolic acid, or a two-per-cent. solution of chlorid of lime. The floor should be scrubbed with a solution of mercuric chlorid 1-2000. This process should be carried out at least twice, especially after scarlet fever, diphtheria, and smallpox.—E. H. Gingrich, M. D., in *Monthly Retrospect*.

◆

ON THE VALUE OF PEPTONIZED FOOD.

At this season of the year the physician with a general practice is called upon to treat many cases of gastro-intestinal disorder in both adults and children, and he is very apt to resort to the various preparations derived from the pancreas with the object of peptonizing milk or other nitrogenous food which he may prescribe for his patient. In many instances the use of the extract of the pancreas for this purpose is followed by the most beneficial results, and it cannot be denied that the introduction of peptonized food into the diet list of the sick was a distinct advance in hygiene and therapeutics. In certain cases where patients seem utterly unable for a time to digest and assimilate food, the administration of pancreatized milk or eggs by the mouth or by the rectum undoubtedly often saves life. On the other hand, as with every good thing in therapeutics, we must not forget that these peptonizing liquids, powders and other preparations, should not be used for an indefinite time in any case, and that their value is greatest rather in acute than in chronic illness. It is a great temptation to the physician, the parents, and the nurse, when a child has just recovered from a severe attack of gastro-intestinal indigestion, which has been largely set aside by the use of pancreatin, to continue to use pre-digested food. But this is a temptation which must be resisted, and the child be gotten back to a diet of undigested food as rapidly as possible, in order that the normal digestive function may be called into play. We are apt to lose sight in practice, because of the good results we frequently obtain with pancreatic extracts, of the facts which have been accumulated by various scientific and clinical observers with regard to this point.

On the one hand, we have the experiments of Polsz, who, using an artificial milk compound, in which the proteids were artificially digested, was enabled to make a puppy increase its weight and grow in the most extraordinary manner in the brief space of eighteen days, and those of Maly, who has reached practically identical results in the case of pigeons.

Other experimenters have confirmed these results, and notable among them is Sir William Roberts, of England, who has done so much in regard to the popularizing of peptonized foods, and who has, on the other hand, with his usual clear perception, recognized the fact that there are limitations to their use. With the object of determining the exact effect of the use of pancreatized foods, he undertook a series of experiments to decide two questions: First, is artificially digested or peptonized milk alone sufficient to sustain nutrition? Second, is it as efficient in this respect as natural milk? He took four kittens of the same brood, eight weeks old, having found that kittens of this age thrive perfectly on an exclusively milk diet. Two of the kittens were fed on natural milk, and two on milk previously digested by pancreatic extract, care being taken that the digested milk was thoroughly peptonized. The experiment was continued for a period of twenty days, and the quantity consumed by each pair of kittens was as nearly as possible identical. All four remained in perfect health and took their nutriment greedily. As a result of this experiment, however, it was found that the kittens which took pancreatized food throve no better than those which took the non-pancreatized, seemingly proving that natural and pancreatized milk were equally nutritious.

The next experiment consisted in giving normal milk to two of the kittens, and only pancreatizing to a slight extent the milk for the two kittens which had received thoroughly peptonized milk from the first. As a result, it was found that the kittens receiving peptonized food did not thrive as well as those which received natural food; proving, to the mind of Sir William Roberts, that the use of completely pancreatized food for a period of twenty days had produced such a condition of rest in the normal digestive apparatus of the kittens that when called upon to carry out the normal digestive processes their digestive organs were unequal to the task. He therefore concludes—and, we think, very properly—that, except in extreme cases where the digestive power is wholly lost or in complete abeyance, it is more advantageous to use food which has been subjected to only partial artificial digestion than to use that in which the process has been carried out to completion, for if the patient possesses any digestive power at all it is better that that power should be kept in exercise than allowed to deteriorate from total disuse. Further, it is not advisable in most cases to continue the pancreatizing of food for any greater period than is absolutely necessary for the maintenance of the nutrition of the patient.—*Therapeutic Gazette.*

ADENITIS OF THE NECK AND CARIOUS TEETH.

A German surgeon, Dr. Starck, has been looking into the matter of the connection between simple and tuberculous chronic cervical adenitis and carious teeth. With reference to this point, he has examined upward of a hundred children between three and twelve years old. Excluding all cases in which any other possible cause could be assigned for the glandular swellings, such as an hereditary tuberculous tendency, recent attacks of measles, scarlet fever, diphtheria, or angina, and the like, he has found that in forty-one per cent. of the children affected with chronic cervical adenitis no other cause could be recognized than dental caries.

Carious teeth, then, are to be set down as among the commonest avenues of infection in children, along with tonsillar tuberculosis. In five cases, of which the histories are given, unilateral tuberculosis of the submaxillary glands developed in immediate connection with toothache. In one of these cases two carious teeth were extracted, and tubercle bacilli came with them. In only one case was the tissue between the roots of the teeth found to be tuberculous.

Dr. Starck draws a practical lesson from his observations to the effect that surgeons should make it a rule, whenever they operate for tuberculous glands of the neck, to extract any carious teeth that may be present, since otherwise they may prove a source of relapse. Moreover, it follows from the importance of carious teeth as points of entrance for infection, especially in children, that endeavors to make adequate care of the teeth and mouth obligatory in schools should have the zealous aid of physicians.—*New York Medical Journal.*

ANSWERS TO CORRESPONDENTS.

Dietary Rules for Bilious Persons.—G. S.—Meats, milk, cream, butter, and all greasy foods should be avoided by persons suffering from so-called biliousness. Preference should be given to fruits and grains. Tea and coffee should not be taken except in limited amounts. The time between meals should be increased, and if three meals are taken, two of them should be very light, and consist mostly of dry food, such as requires thorough mastication.

How to Disinfect a Room.—C. L.—Sulphur dioxide, or sulphurous acid, is esteemed the most potent and easily applied ærial disinfectant for household purposes. The rule of the Health Department of New York City is to use this substance in the proportion of about one ounce of sulphur to every twenty cubic feet of air space, the cubic contents of the room being calculated by multiplying the height, length, and breadth of the apartment. The apparatus employed is very simple, the sulphur being burned in a pan which is floated on water contained in a pail, or in any convenient receptacle of suitable size, and for a period of at least two hours. Chlorine is considered by many authorities to be a more certain disinfectant than sulphur; but the method of generating it being somewhat more complicated, it is not looked upon with favor nor used to the same extent. For the disinfection with this gas of rooms, closets, etc., all windows and doors should for the time be closed and every aperture stopped up. Then the cubic space having been calculated, one ounce of a mixture composed of equal parts of sodium chloride (common salt), and manganese dioxide (black oxide of manganese), to which is subsequently added a fluid ounce of a fifty per cent. solution of sulphuric acid in water is taken for every one hundred cubic feet of air space. On the addition of sulphuric acid solution to this mixture, chlorine gas is freely liberated by interaction of the sulphuric acid with the sodium chloride in the presence of the manganese dioxide which results in the production of sodium and manganese sulphates, water and free chlorine.

The Health Department of the City of New York has contributed much towards a proper understanding of the uses of disinfectants, and the following summary of the results recently determined by this department, as showing the relative value of the below-named germicidal chemicals, may be relied upon as accurate and conclusive. The germ-destroying power of the several agents was tested on the ordinary bacteria of putrefaction. They ranked in effectiveness in the following order:

Corrosive sublimate, 64 grains to the gallon.

Carbolic acid, 5 per cent. solution.

Bromine, 1 pound to 200 gallons.

Permanganate of potash, 17¾ ounces to 200 gallons.

Chloride of lime, 4 ounces to the gallon.

Sulphate of iron, 1½ pounds to the gallon.

Sulphate of zinc, 4 ounces to the gallon.

Common salt, 2 ounces to the gallon.

Drinks in Colds and Bronchial Affections.—D. B.—A useful drink in colds and slight feverish attacks consists of White Wine Whey or Possett. To half a pint of milk, whilst boiling in a saucepan, add one wineglass full of sherry and afterwards strain. Sweeten with pulverized sugar according to taste.

Linseed tea is an acceptable drink in bronchial affections. Place in a jug one ounce of bruised flaxseed, one-quarter ounce of licorice root, crushed, one-half ounce white sugar and two tablespoonfuls of lemon juice, and pour over them one pint of boiling water. Cover lightly, and digest for three or four hours near a fire. Strain through linen before using. This makes a palatable dish, possessing demulcent properties of value in irritable conditions of the bronchial tract.

A Pleasant Way to Take Quinine.—R. S.—Perhaps the pleasantest method of administering quinine and similar powdered drugs of bitter taste is to inclose the powder in a cachet, the Konseals, manufactured by J. M. Grosvenor & Co., 101 Milk Street, Boston, being a particularly desirable form of cachet for this purpose. Another clever means of masking the intensely bitter taste of quinine consists of combining the drug with a little apple pulp. Rasp finely a somewhat sharp apple, spread over it the dose of quinine, cover with another layer of pulp, and swallow. The taste of the drug is pleasantly masked.

Onions for the Complexion.—Onions are not to be despised as a nerve tonic. They tone up the worn-out system, and if eaten freely will show good results in cases of nervous prostration. If a sprig of parsley be dipped in vinegar and eaten after an onion, no unpleasant odor from the breath can be detected. And in addition to this valuable and important bit of information, it may be said that onions eaten freely will also beautify the complexion.—*Journal of Materia Medica.*

Professor Huxley says: "The body resembles an army; each cell a soldier; an organ a brigade; the central nervous system headquarters; the sensory and motor branches a field telegraph; the alimentary and circulatory systems the commissariat; and in which losses are made good by recruits born in camp; and the life of the individual the campaign, conducted successfully for a few years, but with certain defeat in the long run."

KUMYSS IN TYPHOID FEVER.

After many trials with milk as an exclusive diet in fever, it is generally conceded that when given in the form of kumyss better results are obtained. The lactic acid, it is said, is a hindrance to the development of the typhoid bacillus. Owing to the fact that the casein is so finely divided, it is very easily digested, and thick curds are not formed when the casein is separated.

The carbonic acid is soothing to the inflamed mucous membrane, and it has also a pleasant taste to the patient, the secretion of gastric juice is stimulated by this acid, and proves an aid to digestion. Its use seems to be indicated in any case of fever when a diet is needed which is easily digested and which is not flat and insipid to the patient.—*Trained Nurse.*

SITTING.

Students, and all who sit much of the time, should take great care to sit erect, and never in that lazy attitude that rests upon the lower spine, and compress the bowels. I used to think that the right to sit on my backbone and put my feet higher than my head was one of the liberties that my revolutionary forefathers fought and died for; but I have since learned that it is a liberty we may die for ourselves.

Let us briefly inquire what may be done for those who are deformed, and whose shape is fixed by cartilege hardened with age. * * * It is only required to spend fifteen or twenty minutes in the morning when one has little clothing to clog the movements, and the same at night in exercising the muscles that are not often used, and especially in bending the deformed spine back to its natural shape.

And often during the day the chest must be raised high, the abdomen drawn firmly in, and the lungs slowly filled with air, and slowly emptied. By these means Mr. Edwin Checkley, who was a feeble child, and is still a small man, has attained wonderful health and endurance, and is able to lift three common men and run with them. Who is there that cannot raise the chest, contract the abdomen, and take long breaths? And this often repeated, will in time cure deformity, enlarge the lungs, and ward off an army of diseases.—Frederic M. Heath, in "*Why Do Young People Die?*"

REVIEWS.

"CHEMISTRY IN DAILY LIFE."

"POPULAR LECTURES," by Dr. Lassar-Cohn, Professor in the University of Königsberg, translated by M. M. Pattison Muir, M. A., Fellow of Gonville and Cain's College, Cambridge, England, with 21 woodcuts in the text, 324 pages with index, price, $1.50. Published by J. B. Lippincott Company, Philadelphia.

This is certainly one of the most attractive and useful books that has come before us for some time. To one who has studied chemistry at college and then by reason of pressure of other professional duties has neglected the study, this book will bring back in a pleasant way the essentials in daily life of this important science.

To one who is about to study chemistry, "*Chemistry in Daily Life*," will be a firm stepping stone to the higher places in the science.

To the physician or nurse this book must be of great service, for it contains so much that is practical and useful that it cannot fail to find a place in the daily practice of the healing art. We take pleasure in advising our readers to purchase a copy of this book.

THE FAT OF THE LAND and how to live on it, with special chapters on vegetable oils, etc., by Ellen Goodell Smith, D. D. Published by the author at Dwight, Mass.

This is a very serviceable book of 245 pages. It is largely devoted to the interest of those who are specially interested in vegetable diet. Dr. Smith gives a large number of receipts for preparing the "fat of the land," and it will be surprising to see how many attractive and nutritious dishes may be made from food products that are now neglected. We heartily recommend this book.

"PREVENTIVE MEDICINE," by Dr. C. R. Hendrickson. This is a practical treatise on the prevention of disease adapted to lay readers. It is also a valuable aid to physicians and nurses of every school as an aid in treating and preventing disease. "Preventive" is not a term as well understood as it should be by the lay reader when applied to medicine. Practically it means to prevent the use of medicine by learning to live a life with such care of the body and its environment that disease will be prevented, and therefore the use of medicine will be unnecessary. Dr. Hendrickson has given us a very practical little book of only 75 pages, and it is hoped he will so quickly dispose of this first edition as to justify the issue of a large and more extended work in which we trust he will give more attention than he does to self medication through the use of patent medicines. We recommend this book to our readers; it may be had by sending $1 to Hendrickson & Edwards, Yukon, Oklahoma.

SOME six months ago the Funk & Wagnalls Publishing Company issued a circular letter inviting the signatures of authors, editors, journalists, and publishers, as well as of other professional and business men, to Rule I. of a series of eleven rules proposed in connection with a list of reformed spellings which accompanied the circular; the Rule to be binding upon those signing when the list of signatures should reach three hundred.

This rule has now received the indorsement of more than the requisite number of prominent persons, many of whom are willing to support the movement in its entirety. Rule I., which will go into effect shortly throughout the publications of the Funk & Wagnalls Company, reads:

RULE I.

(Based on Rule 7 of the "Ten Rules" of the Philological Societies.)

Change final **ed** to **t** when so pronounced, as in **abashed** (abasht), **wished** (wisht), etc., and, if a double consonant precedes, drop one of the consonants, as in **chipped** (chipt), **dressed** (drest), **hopped** (hopt), etc.

Retain final **ed** *when the* **e** *affects a preceding sound:*

(1) When the preceding vowel sound is long and expressed by a single letter, as the following:

baked, not bakt, because *bakt* would naturally be pronounced like *backed.*
caked, not cakt.
craped, not crapt.
gaped, not gapt.
chafed, not chaft.
coped, not copt.
moped, not mopt.
roped, not ropt.

N. B.—The **e** does not affect the preceding vowel sound when expressed by two or more letters, as in **booked** (bookt), **bleached** (bleacht), **crouched** (croucht).

(2) When a preceding **e** has the sound of **s**, as in **chanced** (not chanct), **forced** (not forct), **faced** (not fact), etc.

THE
DIETETIC AND HYGIENIC GAZETTE
A MONTHLY JOURNAL OF PHYSIOLOGICAL MEDICINE

VOL. XII. NEW YORK, DECEMBER, 1896. NO. 12

TYPHOID FEVER IN WHEELING, W. VA.—AN HISTORICAL SKETCH.

By C. F. Ulrich, A. M., M. D.

There are still some people, even now and then one among the medical profession, who doubt that typhoid fever is propagated through our drinking water. There are some physicians who, although admitting that this is one of the channels for the entrance of typhoid bacillus into the human organism, contend that it is by no means the chief one; failing, however, to give us the necessary information as to the true source.

It is not my intention to argue that question in this paper, it having been established, in my opinion, beyond the shadow of a doubt, that water is the chief medium through which this disease is conveyed into the system. I desire, rather, to add to the proof already given, by relating the history of the typhoid fever in Wheeling for the last twenty-one years, and showing that, in our city at least, there can be no doubt of the influence of water in regulating and controlling this unmanageable and often fatal disease. In 1875 I came to this city and opened an office. The pumping-station of the water-works was then at the foot of Eighth Street, leaving about one-eighth of the city strung out along the bank of the Ohio, above the pumping-station. In this part of the city were about eight sewers, including the one from the Wheeling Hospital. I observed when I brought a bucket of water into the office, in one hour the bottom and sides of the bucket were covered with a disagreeable slime, although the water was perfectly clear, showing that it contained a good deal of organic matter. Connecting this phenomenon with the location of the pumping-station, I came to the conclusion that reform was needed. Within a year after my arrival I was blessed with quite an extensive practice and, of course, contributed my share toward enriching the death-register at the health office. Typhoid Fever, Gastro-Enteritis, Scarlet Fever, etc., abounded. It almost seemed as though typhoid fever were epidemic in Wheeling; I once had twenty-two cases at one time in a radius of two blocks from my office. The communication of typhoid fever through drinking water, had, up to that time, been occasionally mentioned, but not very generally discussed. In a masterly article on typhoid fever by Prof. Karl Liebermeister, in Ziemssen's Cyclopedia of Practical Medicine, the germ theory of disease was very forcibly brought to the attention of the medical profession. This was doubtless the beginning of the bacteriological investigations which have wrought such a complete revolution in medical theory and practice.

Our people in Wheeling had not, up to that time, thought much about this, and the notion that water had much to do with the prevalence of typhoid fever was entertained by but few. The first time I visited the Medical Society of this city, it happened that a paper on Typhoid Fever was read by one of the members. Being invited to participate in the discussion, I suggested the pollution of the water-supply as the chief cause of its prevalence in Wheeling. This was vigorously combatted by many of the members. Feeling the importance of the subject and being convinced that I was not mistaken, I began to write for the daily press, urging the removal of the pumping-station above the city. This set other physicians to thinking and writing on the question. Dr. J. E. Rives, one of our most distinguished sanitarians, whose word would go much farther than mine, took up the matter, and others followed in his train. The argument was that the first thing to be done would be to escape the filth of our own city and the neighboring towns across the river by removing the pumping-station some distance up the river. It soon became a general subject of discussion in the daily papers, in the Medical Society, at the family fireside and on the street. People began to invest in filters and to boil their drinking water. The question, How to prevent the pollution of our water supply was discussed in the city council. The first result of this agitation was the establishment of a crematory for the destruction of the kitchen garbage and the contents of privy-vaults. At last the Board of Water Commissioners made a proposition to the council to remove the water-works up the river, above the city; which, after a great deal of discussion was adopted, the plant built, and in January 1894 the pumps set in motion.

Now we know this did not guarantee absolutely pure water, because there are many towns and cities above us which pour out their filth into the river. But there is a sort of purification taking place in the water as it flows down; the sediment being deposited on the bottom and sides of the stream, carrying with it a large proportion of the malignant bacteria that are entangled with the solid material of the water; whereas the water that flows past the upper end of the city as far as Eighth Street, receiving the outpourings of the sewers and surface-drainage of the First Ward, could not possibly be thus purified. This space, as I said before, contains the Wheeling Hospital, which, till a few years ago, was the only hospital the city possessed. Within five or six years past another public hospital and three private institutions of that character have been established in the city, so located, that, even before the removal of the pumping-station, their waste material would not have been within reach of the intake of the pumps. Now we can make a comparison between the state of things then and now. Then, we had the garbage dumped into the streets and alleys, the privy-vaults overflowing, or their contents taken out and emptied into the river; all the filth from the dwellings, stables and out-houses of one-eighth of the city, including the Wheeling Hospital, which then did all the work of the city, washed into the river and immediately pumped into the reservoir, whence it was distributed to all the dwellings as a pleasant beverage. Now, we have the garbage and the human excreta destroyed by fire, the intake of the water-works located a mile above the upper end of the city, fifteen miles below the next town on our side of the river, and nine miles below the nearest village on the other side. Then, nobody paid any attention to the sanitary condition of the water, fearlessly drinking it as it issued from the hydrant. Now, many of our families possess filters in their dwellings; others use artificial ice, manufactured from distilled water, melting it as required for use. Again, others, who cannot afford these luxuries, boil a sufficient quantity of water every morning to last for the day.

Now let us compare the vital statistics of that period with the present. About the time I began to write on the waterquestion typhoid fever was the most prevalent disease, physicians frequently having more cases of it than of all others put together, while now it is the general talk that there is scarcely any typhoid fever in the city. I know that I have not had a case for more than two years. From 1873 to 1893, inclusive, the average number of deaths annually as collected from the register in the health office from typhoid fever was 47. In 1894, the first year after the opening of the new pumping-station, there were 16; in 1895, only 10, and in 1896, in the nine months ending September 30th, there were 16.

Some of our best physicians, men of close observation, who take great pains to be accurate in their statements, still doubt the correctness of the assumption that water is the principal vehicle for conveying the bacillus of typhoid fever into the human system. They want the advocates of that theory to account for the great variety of the annual number of deaths during the period when the pumping-station was at the old place. They ask me to explain the fact that only 12 deaths occurred during the year, 1893, preceding the removal of the pumping-station. Well, now, that might be rather difficult to do. We cannot measure the atmospheric influences, meteoric, *et al.*, that affect the nervous system, increasing or diminishing the susceptibility of persons to contract a disease when the germ is admitted; nor, unless I had kept an exact account of all the diseases that prevailed during those twenty years and served as a complicating influence on the typhoid fever, could I give even a hint by way of explaining the cause of the varying death-rate. The sudden rise of the mortality in 1890 and 1891 may be partly accounted for by the influence of the influenza or grippe which was sweeping over our land during that period. Our health report shows 128 deaths from typhoid fever in 1896, and 137 in 1891. Now, I would suggest, without intending to cast reflections on those physicians who lost those cases, that perhaps they were not all typhoid fever. Many of them, perhaps, died of grippe. Others, who would have had a light case, had it complicated with the grippe, thus rendering it fatal. Another factor in this result most probably was that, about this time, there was a remarkable influx of foreigners: Poles, Hungarians, Slavs, etc., who, not being acclimated, and neither knowing nor caring anything about sanitary and hygienic conditions, would most readily succumb to the ravages of disease. It was suggested to me that the rise in the death-list from ten in 1895 to sixteen in nine months of 1896 was not a confirmation of my "assumption." To this I would reply that on looking over the register kept by the health officer, I found that about eight out of the sixteen deaths in 1896 were reported by physicians, the correctness of whose diagnosis I would feel inclined to doubt, not from a belief that they would intentionally make a false report, but for reasons that will be evident to most readers of the GAZETTE.

The death-rate is, however, not always the most reliable method of judging to what extent a disease prevails in any locality. But, unless every physician kept a case-book and the writer had access to them all and had nothing else to do but hunt them up, there is no better means of arriving at the result than the register of deaths. There is one indication, however, that points indubitably to the correctness of my position. All over the city, among the more intelligent and observing class of citizens, you hear the remark: "What has become of the Typhoid Fever? It seems to have disappeared from the city." The better class of physicians say the same thing, only getting a case at rare intervals. Those who still claim to have a good many cases are young beginners; pessimists who make the worst out of every case they treat, perhaps for their own glorification, and some who seem to have no special talent for diagnostics. Giving, therefore, full weight to all objections that have been or may be made, I am forced to the conclusion that the sanitary condition of the drinking water is the chief factor in the great diminution and almost entire disappearance of the typhoid fever from Wheeling. It is my opinion that if every city possessing water-works would adopt measures to purify the water and every head of a family would supplement these efforts by purifying the water at home; and that the people living in small towns and in the rural districts would do the same thing, this scourge, that has slain so many victims, might be ultimately stamped out.

MODERN STREET CAR SANITATION.*

By E. B. Borland, M. D.
Pittsburgh, Pa.

That the world is better, cleaner, and healthier than it was even a score of years ago, is evident to any interested observer. That this progress is largely due to improved sanitation cannot be questioned. Improvements, however, have only been made along certain lines, while other sanitarian matters of equal, if not greater, importance have been neglected.

In Pittsburgh, choleraic diarrhœas have been reduced nearly one-half in the last five years, and this reduction may be attributed to smoother, cleaner streets and to purer food supplies.

On the other hand, we still carry with us the municipal disgrace of a typhoid fever mortality more than four times greater than New York, Brooklyn, or even London. In Pittsburg, in 1894, 1,197 cases with 152 deaths; in 1895, 1,593 cases with 213 deaths. Is this progress?

Another of the disease breeding and carrying centers which has received little or no attention, is the modern street car. No public conveyance is so frequently used by all classes; it ought to be a model of sanitary perfection, but alas, it is not; it is probably the greatest single contagion carrier in metropolitan life. Cars with seating capacity for only thirty persons, with less than two hundred square feet of floor space, are frequently crowded, during busy hours, with from sixty to ninety or more passengers. With all the windows thrown open, it is impossible for every passenger to obtain sufficient fresh air in a *crowded* winter car. Where does the unfortunate mortal get sufficient oxygen to sustain life in a *crowded closed* winter car during the average twenty-minute ride? The adult individual needs one thousand cubic feet of fresh air every twenty minutes to supply sufficient oxygen to his system and keep his respiratory organs in normal condition. Does he get five hundred? It is doubtful if he gets one hundred in the average crowded car.

Then each passenger who occupies a seat has the extreme pleasure (?) of knowing that his standing neighbor is spraying his face with an invisible (frosty mornings excepted) mist, always laden with animal matter — and often with disease—twenty times a minute. Each passenger has the satisfaction (?) also, of taking a bath in about two liquid quarts (vaporized) of poisonous skin excretions, thrown off by sixty persons in a twenty-minute ride. To cap the climax, each passenger (always a man) who is inclined, either through ignorance, uncleanliness or viciousness, deposits his surplus saliva or expectoration on the floor, where it dries and is disseminated readily into the air by the movement of the car, and thus disease is carried to all susceptible individuals. Women do not spit on the floor, but they wear skirts long enough to wipe up sputum and carry it with them into their homes.

The five scourges of this city, according to reports of the Bureau of Health, are pneumonia, tuberculosis, diphtheria, scarlatina, and typhoid fever.

The first two in this list were the causes of nearly one thousand deaths in Pittsburg last year. The primary cause of pneumonia is largely impure air which first vitiates the delicate lung tissue. Upon leaving the car the person is attacked by a chill. If he survives the attack he may be left with a damaged lung which is liable to become infected with *the* scourge of the human race, tuberculosis.

That scarlatina, diphtheria and tuberculosis are markedly contagious and infectious cannot now be questioned.

---

* Read before the Sanitary Commission of Allegh an County, Nov. 7th, 1896.

Tuberculosis is the most important disease in the above list, because it causes fourteen per cent. of all deaths, and this is the highest death rate of any single disease. Its prevention gets little attention and "it goes marching on." Less than five per cent. are born with it; more than ninety per cent. become infected after birth. Any weakling, either lean or fat—no difference how robust his parents—may suffer if he breathes a tuberculous atmosphere.

The most important source of infection is, undoubtedly, expectorations from ulcerating pulmonary lesions. The fresher the sputum the more virulent the bacilli. In an ounce of it, millions of the special germ (tubercle bacilli) can usually be found with the microscope. These germs withstand freezing and live for months when not exposed to sunshine and fresh air. Probably not less than eight persons in every thousand are daily expectorating tubercle bacilli. These germs can be promptly destroyed by boiling water (fifteen minutes), corrosive sublimate sixteen grains, and one drachm of tartaric acid dissolved in a pint of water, or a ten per cent. solution of carbolic acid. Either of these solutions can be used in well-glazed cuspidors.

It is now known by medical men that it is not necessary for any child to have an attack of even whooping cough, measles or mumps in order to make him grow. He grows faster, is healthier and happier, and lives longer without having any infectious disease, and, further, it is his *birth-right* that he be protected to the fullest extent possible.

The crowding of, and expectorating in street cars have much to do with the spreading of all the above mentioned infectious and contagious diseases with the exception of typhoid fever, which is a water-borne disease.

PREVENTIVE MEASURES.

Open summer cars during the summer only. The heating of winter cars by electricity, if possible, to economize oxygen. Uniform ventilation. Sufficient number of cars at all hours to seat each passenger. Placing a cuspidor (partly filled with sawdust, moistened with a 1 to 250 corrosive sublimate solution) in a wire rack, a few inches from the floor, in each end of cars; cuspidors to be cleaned each day when car is cleaned. Placards posted *positively forbidding spitting on the floor*, and the unceremonious ejection from the car of any passenger who refuses to obey. A similiar rule is successfully enforced against smoking, why not against the more filthy and dangerous habit of spitting on the floor? A man always looks guilty (as he knows he is) when seen spitting on the floor.

What has been said about spitting on the floors of street cars, and the care of sputum, applies to railway cars and all public buildings with the exception of churches. Church-going people get along without expectorating on the floors of their places of worship, and this is evidence that *all* respectable people can avoid it in public buildings, conveyances, and on sidewalks.

"As a result of the growing popularity of the highlands of southern New York and northern Pennsylvania as resorts for consumptives, the town of Liberty, in Sullivan County, N. Y., has just passed an ordinance (according to the New York *Herald*), forbidding, under penalty, all persons from expectorating upon the sidewalks, dooryards, or floors of houses. The Health Board does not wish the little town to become a center of infection."

Such an ordinance should be passed and enforced in cities as well as towns.

Four hundred years ago Galileo declared, "The world moves." It still moves and the sanitary world must move with it. Until the golden dawn there will always be a few persons who oppose every useful reform and wail over every rotten institution as it falls. On the other hand, there are thousands of intelligent, sensible, respectable citizens who are now ready to put their shoulders to the wheel of preventive medicine. It must roll on until every preventable disease is reduced to the lowest possible limit or eradicated, and this disease cursed world is made, what its Creator intended, a modern Eden.

THE CONFUSION OF THE MATERIA MEDICA RELATING TO THE THEORY AND PRACTICE OF MEDICINE.*

By Elmer Lee, A.M., M.D., Ph.B.
Chicago.

During a recent visit to a patient, there happened to be present an old colored woman, who had recently recovered from a long illness. She told how sick she had been and how infrequent were the visits of her friends. On one of the sick days, she asked the Lord for just one favor. Her supreme desire, at that moment, consisted of a supplication that the Lord might give her a few drops of water to cool her throat. She informed me that the Lord was very busy attending to the white folks, so much so, that it was not in her heart to make Him any more trouble than was necessary. The draft of water was granted, and the simple faith of the old woman was forever established in the belief of the direct mediation of the Lord in her behalf.

A banker, dangerously ill, begged of his attendants, prior to my visit, for a cup of cold water, and the request was denied. Upon my arrival, he ventured to repeat the desire for cold water, thinking, that perhaps it would be again denied. His gratification, when the water was given him, was both a delight to the physician and a surprise to the anxious and tearful wife. The severe and protracted vomiting which had occupied the greater part of the day, immediately ceased upon swallowing the cold water. The simple request of the patient had been regarded with fear and trembling by the inexperienced and untrained observers of his misery.

The actual demands of nature are exceedingly few and simple. The recitals just given indicate two illustrations of the real demands of nature when prompted to express itself. When the study of medicine is begun, during the years of adolescence, the alarm of the student on account of its vastness is well-nigh unbearable. A student confided to me that his fear of inability to remember the materia medica, strongly induced him to reconsider his plan of life. The outlook, he said, appalled him. He felt the responsibility that would attach to the career of a physician, conscious of the confusion in his estimate of the agencies used for the cure of disease.

The list of remedies recommended by the standard authors for the cure of disease, is, indeed, enough to bewilder thought. The new forms which are daily added to the old list, are destructive to the peace and tranquility of even the mature medical mind. When the first pharmacopœia was prepared, in the days of Nero, the total number of articles contained therein, was sixty. Prior to this former collection, remedies for internal use were seldom thought of, and scarcely ever used. The cure of disease was accomplished during the Hippocratic period by the use of hygiene and by external applications. Success of one who became celebrated at this time, consisted in his wondrous ability to mix an odd collection of strangely incongruous substances into a mysterious concoction. Since that day, a glance at the materia medica as it exists, is sufficient to show that changes have occurred. Taking it all in all, perhaps the change is for the better. The present materia medica is too voluminous to practically examine, and a determination of its value is beyond the range of a short life.

The study of Bartholow during college days was as interesting as a romance. Fothergill's elaborate practice and the prescriptions which it contained, surprised and delighted the inquiring mind. The recommendations were closely followed, and hope of the recovery of the sick, was believed to be near at hand. The shock which followed disappointment of the expectations, has never been forgotten. Page upon page of the materia medica was scrutinized for fresh material with which to meet urgent and anxious appeals from the patients. Experience after experience taught, that after all, the cure of the disease was remotely dependent upon the materia medica. The first decade of the physician is a series of experiments with the recommendations of the text-book. The failures which ensue are ascribed to inexperience, and hope springs afresh, in each instance, that a little more experience will teach the correct use of the all-powerful healing agents. The medical life wears on, and the hope of greater triumphs is deferred from time to time. The realization of the fond expectations of a perfect system of scientific medication ends in disappointment. Is this not the experience of the medical profession? Benjamin Rush exclaimed upon his dying day, that diseases were multiplied and their fatality increased. It seems that the greater array of material provided by pharmacy for the treatment of disease, the greater the contention and the increase of confusion. Medical men are widely separated in their views in the estimate of values of different plans of treating disease. No common agreement prevails to any degree. During each generation some special form of medication has occupied the professional mind. One thing has followed another. A close student of the history of medicine will discover, that which seems to be new is for the most part really old. We ask each other, What is new? referring to what is good. There is always much that is new, but what is novel is not always useful. The prevailing tendency during our generation has been the development of an endless number of synthetic products from the laboratory of the chemist. Still more recently, the development of a plausible system of treatment, is based upon morbid animal fluids. It matters very little what the remedy is, or from what generation it takes its origin; throughout the whole series, the best that can be said of them is that they are drugs. There is no natural place in the human economy for drugs. Symptoms are sometimes controlled, modified and suppressed by the administration of the chemic agent, but it does not follow that the amelioration of a symptom is the same thing as the cure of the disease. In fact, the disease is cured by nature, and the public gives the credit to the drug which is, fortuitously or unfortuitously, swallowed. It is very well understood, by the profession, that the influence of pharmaceuticals upon the health of the body is practically a harm. But the estimate of the public is in favor of the apothecary.

---

* Read before the American Academy of Medicine, Atlanta, May 2, 1896.

My words are directed to confrères and not to laymen. The views, therefore, uttered by me are spoken in the deepest sympathy and with the utmost confidence in the intelligence of the profession. The pharmaceuticals offered for the use of the profession to-day number more than 10,000 preparations. The number of proprietary and patented medicines, which are recommended both to the profession and to the public by their makers, constitute a large percentage of the remedies which are prescribed. The tendency is to accept the teaching and the direction of corporations, whose scientific knowledge and interest in the profession is generally secondary to the pecuniary gain. We constitute a body of self-sacrificing and indomitable seekers for knowledge, and must forever regard invasion into our territory by the self-interested vender of proprietaries with suspicion.

Each successive group of medical graduates is elated by whatever prevailing medical belief that is popular at the time of his advent into the profession. Thus, it is seen, that incidents and training have a great deal to do with the views which are entertained, even at a later period of a career. From infancy the belief in the value of the drugs of the apothecary is impressed upon the mind and remains as a guiding principle throughout the existence of the individual. A mother gives the child soothing syrup and paregoric, and anoints the chest with turpentine and lard, which produce upon the mind of the infant an impression which is never lost. The true or false value of these agencies has nothing to do with the fixed lesson which is remembered. It can be seen that owing to these drug impressions upon the young and growing mind, how difficult are reform processes in treatment, both in lay and professional ranks. The student is influenced by the lecture and refers to the notes of the lecturer or the author's textbook. It was a common practice during the teaching of one celebrated lecturer to address the class somewhat like this: "Gentlemen, this is a case of asthma; not much is known of asthma, and the treatment is found to be very disappointing. The thing to-day, is to find out what *drug* best agrees with the patient and to continue it." Whatever may have been the opinion of the class, the recollection that a *drug* was recommended is most difficult to remove from the memory.

The more numerous the list of remedies, the greater the confusion and difficulty for medical minds to consummate any agreement upon disputed ground. Differences in diagnosis exist, of course, but are infrequent compared to the wide disparagement between opinions with reference to the treatment of disease. The object of medical study and the practice of the profession of medicine is for the exclusive purpose of rendering practical assistance to the sick. All other questions are subordinate to the actual requirements indicated by danger of death. It is not within the scope of my present remarks to advocate a remedy for the evil to which these observations pertain. There is, however, a system of treatment of every disease which is either remediable or curable, which does not contemplate the long rows of black and vari-colored glassware which ornaments the apothecary shelves.

In no other allied science would such a state of confusion be tolerated as that between the materia medica and the theory and the practice of medicine. Chemistry is definite, physiology is definite, and anatomy is stable; therapeutics based upon materia medica are unsettled. When may we expect a change for the better? Is it to come through the use of horse serum? Emphatically, no! Will coal-tar products reduce the materia medica to a science? No. The profession has been going on for over 3,000 years, studying the diseases of the body and experimenting, to find out a system of therapy which is scientific. It is as far to-day from that perfection, which is desired by all, as it was one hundred years ago. There were those at that time who succeeded in both ameliorating and curing disease. Such persons are among us also to-day. But the great mass of physicians, as well as the great majority of the patients, are controlled by a system of therapeutic reasoning far from scientific. There will be exceptions to my views, but the exceptions will melt away upon sifting the actual facts of the case. It is not my intention to throw any blame upon the manufacturers who are contributing these preparations, nor is it my purpose to unsympathetically criticise the practice of the profession. The state of affairs is accepted as the best by the majority and doubtless will continue. There has been confusion from the inception of the science of medicine, and probably will go on indefinitely. It is my desire to call attention to the appalling burden which the materia medica has placed upon us, with reference to correcting the methods of practice, as taught to the students of our medical colleges.

THE DRY EARTH CLOSET, THE GREATEST SANITARY NECESSITY IN RURAL DISTRICTS.

BY DR. HARVEY B. BASHMORE.
West Fairview, Pa.

IF THERE is one sanitary necessity which stands pre-eminently above all the rest, it is, to my thinking, the substitution of the earth closet for the foul privies and cesspools of rural districts. Privies undoubtedly contaminate the ground water and the ground water seems to be about the only source of supply for isolated localities. We know so little about the changes of the ground water and so little about the life history of the germs of certain water-borne diseases, that there is danger wherever the ground water is exposed to excreta.

It is an undeniable fact that the privies in most villages are rarely emptied and one bright sanitarian has explained this by the fact that the wells drain a good deal of their water from the urine of the neighboring privies; and this can readily be the fact in many places. In the average country town not one person in a thousand uses an earth closet or, in fact, seems to know anything about it. If we could get village dwellers to understand the sanitary value of this method of excreta disposal, it would be a great step in progress. Some of the State Boards of Health are working in the right direction and issue circulars containing instructions for the making of earth closets. The material to be used in the receptacle may be either ashes or dry earth. In summer dry earth can be taken directly from a garden bed and for use in winter may be stored in barrels.

Ashes are perhaps better if the closet is in the house, for the ashes are lighter and more absorbent. I can state positively from experience that an ash closet if properly used, is absolutely inodorous; hard coal ashes are the right kind to use and should be sifted through a fine sieve; there is no better way than this to dispose of the winter's ashes.

The disposal of the contents of the closet is perhaps the stumbling block to many. This material, whether ashes or earth has been used, may be placed on a corner of the garden bed and covered with a little earth or it may be buried a few inches under the soil; or, lastly, it may be kept in a dry place, covered with earth and carted away at some suitable time by the farmer for use as fertilizer; of course the agent of disposal in all cases is the nitrifying bacteria. To be sure, if too much ash is used, nitrification is delayed, but with the mixture of a little earth the results are all that one could desire.

Another way of using the earth closet, especially for schools or large dwellings, is to have the privy constructed with what Prof. Coore calls a dry catch, which is a large, dry and cemented vault underneath. The seat is very much like the hopper of an ordinary water-closet with a movable pan at the lower end to prevent draught. The excreta fall to the vault beneath and every evening they should be covered with dry earth through an opening on the outside. Every week or so the contents are taken away for fertilizer. This is the ideal method for disposal in country schools but it will likely be many years before country school boards adopt it.

It seems to me, that small incorporated towns might be able to do something on the line of the dry earth privy, by having a scavenger clean all privies every week; individuals can not be depended to take care of earth privies, at least just at the present state of progress.

◆

BHOWANI, THE CHOLERA-GODDESS.*

SOME EXPERIENCES IN HINDOO SANITATION.

By E. H. Hankin.

THAT an Englishman on visiting an Indian village in which cholera was raging should be able to offer the inhabitants no advice which he was certain was good and at the same time practicable, except that they should pray to Bhowani, the Cholera-Goddess, may appear a matter for surprise to people in England. When it is further explained that the Englishman had come to the village furnished with such resources of modern science as a portable bacteriological laboratory, which included an autoclave and an immersion lens, and that he had some experience of cholera epidemics under different conditions in India, the surprise will not be lessened; neither will it be

---

*The *Nineteenth Century*, Oct. 1896.

diminished when it is learnt that Bhowani is another form of Kali, the terrible goddess of the Thugs, those road murderers who used to appease her by offering human sacrifices. Nevertheless, this was my experience on the occasion of a visit which I made to the Balrampur district in the antumn of the year 1894, and I venture to think that an account of my experience may prove of some interest.

Balrampur is a small native state, about half as large as England, situated to the north of the River Gogra, and lying within sight of the snow-clad ranges of the Himalaya Mountains. Much of it is frequently flooded. Fever is constantly present, and cholera breaks out almost every year. No railway exists nearer than Gonda, which is twenty-six miles distant from Balrampur, the chief town of the state. One or two roads run through the district, away from which traveling is difficult, especially during the rains, when, as was my own experience, the tracts are impassable for horses and heavy going even for elephants.

My object in spending a few days' leave in this place was to see if it might not be possible to check the march of cholera by disinfecting wells. Thanks to the kindness of Colonel Anson, the Political agent, I found myself installed in a comfortable bungalow, with the town in which cholera was present on one side, and the village of Dhusaha, in which the disease was also raging, on the other. A soldier belonging to the state had died in the compound and one of the only two Europeans in the place had died of the same disease, in each case a few days before I arrived. I afterward found that two out of the three wells in use in the compound contained the microbe of cholera, and were probably responsible for these deaths.

The villagers at first objected to my putting any medicine in their wells. I regret to say that, so far as my experience goes, the first symptom of civilization among the lower classes in India is that they develop a sort of inverted conscience, which pricks them whenever they tell the truth. In Dhusaha this influence had not yet arrived, and consequently my suggestion to put a medicine in their wells was met with a plain-spoken and unambiguous refusal. I therefore spent my first few days in the place in making bacteriological observations and in studying the beliefs and customs of the inhabitants.

The village Dhusaha consists of a collection of mud huts. There had been about 320 inhabitants, but seventy-eight had died of cholera in the epidemic that was then existing. The water supply is obtained from four shallow wells. The mud huts are constantly falling down in the rains, and mud to repair them being taken from a piece of waste land, the hollow thus formed has gradually formed a tank. Refuse is usually thrown down on the margins of the tank; hence, its water is so putrid that the inhabitants not only do not drink it, but I believe do not use it even for washing clothes. The inhabitants pointed out to me that the reason why the water in one of the wells was bad was that it was situated near the tank, and that the bad water from the tank traveled along under the ground to the well and gave a disagreeable taste to the water. I afterwards found that the water of this particular well contained no less than 7,000 microbes per cubic centimetre, and thus thoroughly deserved the character the villagers gave it.

The inhabitants are all high-caste Hindoos, mostly Brahmins. Not a single sweeper or other low-caste man was in the place. Being of high-caste they only eat food which has been cooked by themselves, and this only when it is perfectly fresh. They eat no sweet-meats or other food brought from the bazaar in the neighboring town. Their food consists almost entirely of rice and pulse, with occasionally a little unrefined sugar or dried mangoes.

But what chiefly aroused my interest was their views of cholera, and their religious observances in the presence of this scourge. If cholera breaks out in a village, the inhabitants say that it is due to Bhowani their goddess, or to the army of Bhowani being present in the place. They regard it as a judgment for their sins and short-comings, and, as in other religions, they consider this evil to be a blessing in disguise. They immediately commence to propitiate the goddess by sacrificing flowers and rice. When traveling through the district the first sign of the presence of cholera which struck the eye was a small booth of grass mats surmounted by flags borne on long bamboos. In Dhusaha such a booth had been erected on the margin of a well which contained the cholera microbe, and in this booth the chief "jogi," or priest, of the village prayed with about a dozen of the older villagers. I myself heard him praying on three successive days in a loud voice, and I believe he prayed the whole day long with scarcely an interval for refreshment. I shall mention him again later on.

The villagers in this district, however, not only attempt to propitiate Bhowani by prayers and sacrifices, but also by certain rules of conduct, which appear to me to be of interest and importance. Firstly, they say that Bhowani will be angry if any of the inhabitants leave the village. Secondly, they say that she will be angry if any outsiders are allowed to come into the village at a time when cholera is present. A curious incident illustrating the good effect of this belief happened at about this time in a couple of villages some distance from the town of Balrampur. There was only one well between the two villages. Cholera one day broke out in the village which possessed the well. On the next morning women came as usual from the other village to fetch water. But the inhabitants of the first village turned out and refused to allow them to approach, on the grounds that Bhowani was among them and would be angry at being disturbed. The inhabitants of this second village had to get their water elsewhere, and consequently came into the town to make a complaint. It may be noted that the official to whom they chose to bring their complaint was not the native prime minister or the native secretary for home affairs, or any other native official, who might be supposed to be better able to sympathize with their wrongs, but the head stableman, who was the only English official in the district at the time. I have no doubt that he pointed out to them that if they could not get their water, they were equally unable to get the cholera through this source.

Granting that the spread of cholera is chiefly furthered by human intercourse (and this at the present time few people seem inclined to doubt), it appears to me difficult to see how cholera could spread if these simple rules were rigidly enforced.

But there are other ways of avoiding the wrath of Bhowani which appear to me to be only slightly less admirable than those above mentioned.

Firstly, they say that Bhowani will be angry if any one takes medicine when cholera is about. Perhaps I owe some apology to medical men in suggesting that this rule is good. But when it is considered that if the natives were willing to take medicine, they would often have to walk twenty miles to the dispensary to get it, thus increasing the risk of spreading the disease through the four thousand villages that are in the district in question, it will be seen that there are advantages in the plan. Further, it would often happen that the medicine would arrive too late to have any effect on the patient, and probably it would have a bad effect on the relatives in making them doubt the efficacy of English drugs. Cholera in this district often kills in a few hours, and when a fairly unanimous choice has been made as to which of the thousand and one now existing remedies is most likely to be able to cope with it, it will be time to object to the custom in question. The wish to do something when one sees a fellow creature in pain is very natural. I saw an old woman dying of cholera in Dhuasha. The sole treatment to which she had been subjected was that a mud plaster had been spread over the stomach, and small doses of holy water from the Ganges were being poured into her mouth. The latter treatment was intended as a medicine for her soul rather than for her body, as every Hindoo should, according to the prevalent belief, drink this water before his death. Her relatives were too troubled by the occurrence to object to my putting some salol which I happened to have with me into this water, but it certainly did no good to the patient, and had I at the time known more about their religion, I should have avoided the risk of hurting their feelings.

When Bhowani is in the village, it is also necessary to avoid feasting and other forms of indulgence. The excellence of these rules is sufficiently obvious.

What is the origin of this worship of Bhowani, every detail of which, excepting the sacrifices, appears to be a sanitary precaution? Is Bhowani the name of some primeval bacteriologist, who has since been deified? Or of some early sanitary commissioner, whose studies on the nature of cholera have since earned him a place in the Hindoo pantheon? Or, on the other hand, has the form of worship arisen by some process of evolution from a simpler and perhaps less admirable model? *A priori* the latter alternative would appear to be the most probable, and it agrees the better with some inquiries I have instituted since my return to Agra. Bhowani is another name of incarnation of the goddess Kali.[1] There are not many worshipers of the goddess in the parts of the North-West Provinces with which I am acquainted They occur more frequently, however, in the neighborhood of Calcutta; and here I made inquiries. I found, however, no trace in her worship of the above-described sanitary precautions. After some search, I met in Agra with a most devout worshiper of Kali, who had given up his business in order to be able to devote his time to religion. He showed great willingness to tell me everything connected with the ritual, and further gave me free permission to chop off his head if he could not stop a cholera epidemic by offering sacrifices and prayers. He was, however, more shocked than interested in the ideas of his fellow religionists in Balrampur, and I found in his worship of Kali no trace of any hygienic precaution. He told me that if cholera is present in a village, it is necessary to sacrifice to Kali every day, and that while the public worship, which may last about two hours, is going on, it is necessary that no one of the inhabitants of the village should stay away. Further, while the worship is proceeding, the inhabitants do not like strangers to come into the village and interrupt them, either by drawing water or in any other way. It would seem that, in Balrampur, it is these details of the ritual that have been more developed than they are elsewhere. In other places the worshipers of Bhowani or Kali seem content with enjoining that the inhabitants should remain in the village during the two hours during which the religious ceremony is going on. In Balrampur, on the other hand, it is considered necessary that every one of the inhabitants should remain in the village during the whole of the twenty-four hours. Elsewhere, the worshipers merely object to their service being interrupted. In Balrampur they object to strangers coming into the villages at any time when cholera is present, as if the worship were proceeding continuously.

I have left to the last a curious custom, rather than a religious observance, which is met with in the Balrampur district. It relates to the disposal of the dead. The body of a person dead of cholera, instead of being burnt, is buried. This may appear at first sight to be an unsanitary proceeding. But in reality it is the reverse. Usually the bodies of Hindoos are burned. It is a necessary part of the ritual that on the fifth, tenth, eleventh, or thirteenth day after the burning, according to the caste, all relatives of the deceased should meet in his house with as many Brahmins as can be obtained, and that they should have a feast. Supposing this to be done at a time when cholera was present in the village, there can be no doubt that it would lead to the diffusion of cholera over the surrounding district. A case in which this appears to have happened is mentioned in a resent report by Surgeon-Captain Pratt on cholera in the Gonda district. The worshipers of Bhowani, on the other hand, prefer to bury the bodies until cholera has vanished. The burying of the body is not followed by the assemblage of the relatives for the funeral feast, but after the cholera is over, they dig up the body, burn it, and then carry out the religious ceremonies. I cannot find that this apparently unsanitary proceeding has ever re-started the cholera. Nor is it likely that it should, for it has recently been shown that the cholera microbe rapidly perishes in buried corpses. How far this disagreeable custom may be objectionable in respect of other diseases I am not prepared to discuss, but I have little doubt that it tends to prevent the spread of cholera.[2]

---

[1] Kali is the Destroyer. Diseases and pestilences are caused by her emissaries. The views of the Thugs were that they could please her by acting as her emissaries. Consequently they regarded the murder of their fellow creatures as a religious act.

As already stated, my object in coming to Balrampur was to disinfect wells, and my proposal to do so had been met by a direct negative on the part of the Dhusaha villagers. After learning their belief as to the nature of cholera, and the nature of their objections to the presence of a disinfectant in their wells, I was in a position to attack them again on the subject. Knowing that it is more easy to convince people by education than by argument, I collected about a dozen jogis and other kinds of fakirs and some Brahmins, and gave them a lecture which, with the accompanying experiments, lasted about two hours, and was completely successful in its object. Those who know fakirs chiefly, as I have seen them, hanging for hours head downwards, over a hot fire in the burning Indian sun, or attempting to earn their salvation by other eccentric methods, such as sitting on a bed of upturned nails, may think that I was too sanguine in hoping to succeed, and a short account of this lecture may therefore be of interest.

I commenced my lecture by showing them a human hair under the microscope, first slightly magnified, and then under increasing degrees of magnification, until, as they affirmed, it looked as large as a tree. Then I showed them some mildew growing in a test tube; this they recognized. Then, under a low power of the microscope, they saw that the mildew consisted of a mass of threads. Under a higher power (a magnification of 750 diameters) they recognized with evident interest that it was a plant, and they themselves pointed out the branches, the roots, the flowers, and the seeds. I then showed them a large collection of microbes which I had at that time collected from different wells in the neighborhood. In each case I gave the name of the well in the hope of increasing their interest on the subject, and with the *arriere-pensce* of suggesting that their water was in need of improvement. The first microbe which I showed them was a large bacillus, that had grown out into long rods similar in thickness to the threads of which the mildew consists, and containing rows of spores which they recognized as seeds. I then showed them the same bacillus at an earlier stage of its growth, when the individual rods were shorter and slowly moving through the culture liquid. The next microbe I exhibited was still smaller and rapidly motile. The last was the smallest, and moved so quickly across the field of view that they could only see it with difficulty. This was the cholera microbe. I told them that it was the army of Bhowani, but afterwards referred to it as the "cholera mildew." I pointed out how in some respects these creatures resembled plants, in others animals. Since they had seen them moving, it was no use asserting that they were merely plants, so I contented myself with asking the question, "Who can tell which they are, animals or plants?" I then told them that the food of these creatures is dirt. I showed them some peptone under the name of the "essence of dirt taken from the inside of a pig." The nomenclature may appear strange, but if I am right in believing that peptone is usually made by allowing a pig's stomach to digest itself at a warm temperature, it at least cannot be described as highly inaccurate. I then showed them some water to which some of this "essence of dirt" had been added. I told them the name of the well from which the water had been taken, and explained that on the previous night the cholera mildew had been present in such small quantities, that I was unable to see it by means of the microscope, but that owing to the "essence of dirt" having acted as food, the water now looked as if milk had been added to it, and the reason of this was that many thousands of the cholera mildews were now present in every drop. It may be explained that the addition of peptone to water in this way is the ordinary method of testing for the cholera microbe.

---

[2] In many parts of Oudh it is a custom to throw the bodies of persons dead of cholera into rivers. In other parts of the country, this fate happens to the bodies of persons dead of snake-bite. Still more widespread is the custom of disposing of the bodies of lepers in this way. For this I believe there are religious reasons. The bodies of young children are not cremated. In the case of poor people the cremation is often very partial, and the greater part of the disintegration is left to the sacred turtles which are always waiting at the burning ghats.

I then somewhat changed the subject by asking why it was that no one ever got cholera by drinking holy water, whereas many persons died of cholera every year by drinking water out of ordinary wells. Holy water, it may be explained, is water taken from the Ganges or Jumna.[3] Many bodies of persons dead of cholera are thrown into these rivers. Natives constantly drink the water of the river while cholera corpses are floating past, yet none of them contract the disease from so doing. Yet it is certain that the cholera mildew gets into the water. Further, this must also happen when cholera breaks out at religious festivals at Hurdwar and Allahabad; yet there is no evidence that cholera spreads to villages down-stream more quickly than it does to other villages, to which it is carried by the returning pilgrims. I suggested that the reason of this is that the water of these rivers contains no dirt suitable for the cholera mildew. Consequently, when it gets into these rivers it quickly perishes owing to lack of nourishment. The water of these rivers appears to be muddy. If some of the mud floating in their water is examined under the microscope, it is seen to consist of nothing but little pieces of stone. If the mud from a well on the other hand, is examined, pieces of leaves, of clothes, of human skin, and of other particles of animal origin may be discerned. Such things furnish food for the cholera mildew. Consequently, if a trace of the cholera mildew gets into one of their wells, finding there a suitable food, it rapidly reproduces until the cause of cholera is present in quantities in every drop. Here in Balrampur the wells were dirty, and hence cholera came and was bad every year. In Agra, on the other hand, where I came from, the wells were cleaner and cholera was far less frequent.[4]

I then went on to ask how cholera could be stopped. This could be done by adding to the wells a medicine which I possessed, which had the wonderful power of destroying dirt. The medicine, it may be explained, was potassium permanganate. To exhibit its action, I placed before them two glasses of water. To one I added a small quantity of the "essence of dirt." The other was pure water, or, rather, the best that I could obtain. I showed them some potassium permanganate, dissolved it in water, and added a few drops of the solution to each of the glasses. The purple color produced by the addition remained permanent in the glass containing clean water; but in the other, owing to the presence of the peptone, the color was destroyed in a few seconds, giving rise to a yellow color; and presently a brown precipitate was deposited. I pointed out to my audience that where dirt was present the medicine had combined with it. The medicine was destroyed, and also the dirt, both falling to the bottom as a precipitate. I pointed out that this might be done in a well just as easily as in a glass, and that by so doing they inevitably render the water less fitted to support the life of the cholera mildew, and make the water like that of the Ganges.[5] I did not ask them to take away the life of any living creature, for this I knew was contrary to their religion; but I did ask them to remove its food and thus prevent this living creature from reproducing itself, and so giving them the cholera. Further, I said that I knew that drinking an English medicine was also contrary to their religion, and I did not ask them to drink it. There was plenty of dirt in their wells with which it would combine, and if they added it at night, it would, before the morning, have fallen to the bottom. Further, as they could see for themselves, if a trace of the medicine was present in the water, it produced a purple color, and therefore if they waited till the purple color had disappeared, they would be safe to avoid the chance of swallowing the medicine.

---

[3] Evidence of the extraordinary purity of the Ganges and Jumna may be found in a paper which I read at the Indian Medical Congress in Calcutta [December, 1894], entitled "On the Microbes of Indian Rivers."

[4] I have stated some of the grounds on which this and other opinions expressed here are based in *The Annual Report of the Chemical Examiner and Bacteriologist to the Government of the North-West Provinces and Oudh* for 1894, published at the Government Press, Allahabad. But since writing the above, I have been led to the view that there is something in the water of the Ganges and Jumna which kills the microbe.

Whether they were most impressed with the cogency of my arguments, or the exceeding badness of the Hindustani in which I expressed them, or by the price of my microscope, I do not know; but they appeared to be satisfied that it was a good thing to add the medicine to the wells; some of them even appeared to be eager to do so, since cholera was in their villages.

After giving this lecture I went to Dhusaha, and at last persuaded the chief jogi, Mahadeo Purhit by name, to allow me to put medicine in his well. The natives crowded round, showing much surprise at the quantity of color produced by so little of the substance. The addition was made at evening, and on the next day both the color of the permanganate and the cholera microbe which had previously been in the well had completely vanished.

Later in the day news was brought to me that Mahadeo Purhit was dangerously ill. I hurried over so see him, and to my dismay found that he was dying of cholera. In the afternoon he died. I went again immediately to the village, not feeling very sure of the reception I should get, since it was inevitable that, sooner or later, the inhabitants would come to the conclusion that his death was a judgment from Bhowani for his allowing a Sahib to come into the village and to put medicine in his well. However, I thought that it might be possible to prevent their arriving at this conclusion by first getting another idea into their heads. I spoke to the villagers, and pointed out that his death proved the truth of what I had been saying, for I had said that the cause of cholera was in his well at a time when no one who drank its water was suffering from the disease. Now he had died from drinking this water. If I had put the medicine into the well a week earlier, he would now have be I then seized the opportunity of making some prophecies about other wells which were in the village, and in which I had found the cholera microbe; and without more ado the villagers allowed me to put permanganate into all these wells.

It may be noted that it was most important that the villagers should have no objection to this medication of their wells. For if they did not approve of it, they might obtain their water from a tank or some other source which might be worse than the well itself. Although I succeeded in showing the natives that the addition of this medicine implied nothing dangerous to their caste, I could not help their being at first a little frightened of it. So I drank some water (and this was the second of the two occasions only on which I have drunk water since I have been in India) from one of the wells in the village, to which permanganate had been added; this I had to do in order to convince the natives that it was not poisonous.

The cholera stopped within three days of the treatment of the wells, that is to say within a time covered by the probable incubation period of the disease. It is not the object of this paper to prove that the disinfection of wells during cholera epidemics is useful, so I will confine myself to saying that the results obtained in other epidemics as in this have been encouraging, but not conclusive, as to the value of the method.

---

[5] Some evidence that permanganate really acts in the way here described—namely, by removing the food of the microbe and thus "starving it out"—was subsequently obtained in an epidemic of cholera in Shahgunj. Here the cholera microbe vanished from the well water a few hours after the addition of the permanganate, but reappeared on the following morning. But within three days it had wholly disappeared from the wells which had been treated, though it continued to exist for weeks in other wells that had not been medicated. Less than two ounces of the permanganate had been added to each well.

I wish, rather, to suggest that a help to progress in sanitation in India may possibly be secured by studying the customs of the people in the light of recent knowledge, and by encouraging those which appear to be of use. The customs above described exist, so far as I am aware, over a limited area only, and from the standpoint of others than the inhabitants themselves, this religion which makes quarantine in the presence of cholera one of the cardinal virtues is little more than an ethnological curiosity. In other parts of India the religious beliefs of the people impel them to the most unsanitary actions, especially at their religious festivals, which are known to be so potent in spreading diseases.

But I have come across customs which exist over a far wider area, and which I believe to have a beneficent influence in limiting the spread of epidemic disease. Take, for instance, the customs connected with giving water to strangers. I have been told that in some districts Brahmins keep a bucket and rope at each well for the special use of travelers, these not being allowed to lower their own buckets into the well. In other places a man also is provided to draw water for strangers. Sometimes, in the case of villages situated near to the high road, a man brings water from the village to sell to the passers-by. But I believe a more frequent plan is for the villagers to subscribe, and to keep going a house in which passers-by can obtain water free of cost. A man of high-caste sits inside the house at a little window. A traveler comes up and asks for water. In England he would receive it in a glass which he would put to his lips, and after having deposited on the edge of the glass microbe which he might happen to have about him, whether influenza, diphtheria, or whooping-cough, would return the glass in a condition in which it might possibly be ready to infect the next comer. In India the simple process of giving a cup of cold water is carried out with more regard to sanitary laws. Firstly, the traveler states his caste. If he is of high-caste, immediately he holds out his hands and washes them with water poured into them. Then more water is poured into his hands and thus conveyed to his mouth. If by any chance he should happen to touch the drinking vessel, it would be necessary to heat it in a fire to sterilize it, or, as the natives say, to remove the defilement, before it could be used again for the next comer. Supposing the traveler is of low-caste, that is to say one engaged in some filthy occupation, then the water cannot be poured direct from the vessel into his hands, because, as was explained to me by a Brahmin, it is possible that some defiled water might splash back from the man's hands on to the vessel. Hence the low-caste man has to drink from a little spout called a "tonti," usually made of bamboo, projecting from below the window. The water-provider pours water from his vessel into a sort of funnel. Thence it issues by the spout, and if any water does splash back from the man of dirty occupations, it merely falls on to the spout, and there is no risk of its infecting the water supply for the next comer. If one realizes the complete absence of the dirt-fearing instinct, among, for instance, the sweepers, and the fact that it is their business to remove the most filthy offal, which they generally do with their hands, and that consequently their hands are liable to be polluted with the most objectionable microbes, it will be understood that the above precautions are by no means a useless refinement. When I was examining one of these places the water-provider offered me a drink, adding that he had a glass. When I reflected that I had only just recovered from a mild attack of cholera, owing to an infection contracted in my laboratory from a moment's carelessness, I felt more inclined to drink from the spout than to run the risk of infecting his water by drinking in the English fashion.

It is now abundantly proved that the cholera infection is often carried into villages by returning travelers. There can be no doubt that it then infects others by the intermediary of the village well. In reading certain reports which contained much evidence in favor of this statement, I was struck by the fact that the traveler in each case appears only to have brought the disease to the village to which he returned, but does not seem to have deposited the infection in the villages through which he passed. There is the possibility that this, if true, is due to the above described arrangements for giving water to strangers. This inference, however, cannot be made with certainty until investigations have been made, both as to the customs in the villages in question, and as to the amount of cholera in villages situated on the high roads. Against this idea may be stated the fact that cholera is known to be frequent along great pilgrim routes. But it is possible that this is an exception which helps to prove the rule. Owing to the vast numbers of pilgrims passing along the roads, it would, I suspect, be impossible for the villagers to provide water for them all to drink, and it thus becomes necessary for them to draw it for themselves.

I have had opportunities of watching the customs of these pilgrims at the large religious festivals held annually near Allahabad, at the point of junction of the Ganges and Jumna. For miles along the roads leading to the fair, and all over the plain near the site of the fair, families of Hindoos (chiefly Brahmins) can be seen encamped, and cooking their simple food. Before eating they take off all their clothes, except a loin cloth, and wash themselves all over, for fear some defilement may be present on their clothes or bodies. As is well known, they object to a person of another caste coming near to them while they are eating. It is not so well known that they have no such objection if their food has been heated to a temperature sufficient to kill microbes, that is to say, if it has been fried in oil, except so far as persons are concerned who belong to the five lowest castes. The occupations of members of these castes are regarded as unclean, and they are not allowed to come near high-caste Hindoos while they are eating under any conditions, neither are such persons allowed to bring the uncooked food of Brahmins from the bazaar. It is obvious that each one of these rules has a tendency, though it may be slight, to prevent men of higher caste from swallowing the microbes which can cause disease. Unfortunately, when at pilgrimages, they do not appear to pay much attention to the precautions which at that time are most required. I questioned several of them on that point, and they told me that they took no care as to what water they drank. I may parenthetically remark that I was walking alone among these natives without any imposing array of police or other officials. The only sign that I was an official was the doubtful one that I was carrying a note-book. Yet frequently as I passed the natives would turn round and call out after me, "God bless the power and property of the English government." I was particularly struck by their using the term "English," and I commend the fact to the attention of the members of the National Congress.

Sometimes the customs attending pilgrimages are fearfully unsanitary. For instance, at the site of a pilgrimage in the Madras Presidency is a hill which is supposed to be a god. It is surrounded by twenty-four small tanks. On the great day of the festival nearly a hundred thousand persons bathe in and drink the water of each of these tanks. Each tank is thus defiled by everybody, since, for religious purposes, every one must go round the hill and bathe in each of the tanks. Little wonder that these pilgrimages are potent means for the spread of cholera.

The idea that natives in certain parts of India, when in their villages, habitually take precautions to insure the purity of their water supply may seem strange, not only to

English readers, but also to Anglo-Indian officials stationed in certain other parts of India, where no such care is taken, as, for instance, is, I suppose, the case in localities where the supply of drinking water is derived from tanks. Here, I am informed, the natives are in the habit of washing themselves, their cows and the Sahib's shirts in the tank that also acts as the village cesspool and the village water supply. Personally, I know nothing of these parts of India. The following account is based on experience obtained near Agra and in other parts of the north-west provinces.

In every village at least one well is reserved for the supply of drinking water. Only vessels especially reserved for the purpose are allowed to be lowered into such wells. Great care is taken to preserve the drinking-water vessels from pollution. Mussulman water-carriers or bhistis,[6] do not allow any one but themselves to touch their water buckets or the skins in which they carry their water. Hindoos generally draw water in an iron vessel known as a "dol." This is only used for drawing the water. When required the water is poured into another vessel, and only from this other vessel is the water poured into the hands of any one requiring a drink. No one is allowed to go onto the platform of a well without removing his shoes

Other wells in the village are reserved for household purposes. The vessels used to draw drinking water are never allowed to be lowered into these wells by Hindoos. I suspect that Mussulman bhistis are not so particular; at any rate this is the case with bhistis employed by English people. The poorest Hindoos have two separate sets of vessels, one to hold drinking water, the other for water used in household purposes, such as washing the cooking vessels.

Houses, being generally made of mud, are constantly in need of repair. The workmen (or coolies) who need water for carrying out this work necessarily employ very dirty earthenware vessels. I am certain that these are not allowed to be lowered into drinking-water wells, and I believe they are not allowed to be lowered into wells used for household purposes. A small tank containing dirty water is generally attached to each well, and from this the workmen take the water which they need in repairing houses. When first I saw these tanks I thought it was rather unsanitary to have such dirty water so close to the well. But the above statements, I venture to think, make it obvious that it is better to have such tanks than that coolies should lower their dirty vessels into a well used for drinking purposes.

I once asked a completely uneducated native why it was necessary to have dirty wells in the place, why the dirty wells could not be closed and all the water, whether for drinking or household purposes, be obtained from clean wells. His answer was that if this were done diseases would become prevalent. Whatever truth there may be in this answer appears to me to depend on the practical necessity that in some cases dirty vessels have to be lowered into wells; and hence it seems to be a good plan, as things go, to reserve some wells into which alone such vessels may be lowered.

I recently had to do with a cholera epidemic, in which certainly most of, possibly all of, the infection was derived from wells used for household purposes, and it is probable that the disease would have been far more widespread if the water of such wells had been actually drunk by the mass of the population. The epidemic[7] in question occurred in Shahgunj, and at the time it was stated to be inexplicable on the grounds that only women had been attacked. I found that the latter statement was true so far as the first part of the epidemic was concerned. The women who were affected had no supply of drinking water in common. Some of them obtained their drinking water from a well situated a couple of miles away from their houses. But out of seven cases I found evidence that six had been in the habit of going to one well, which was used, not for drinking, but only for household purposes, and consequently was chiefly frequented by women. A few poor Mussulmans, however, were in the habit of using the water for drinking purposes. Hindoos used a better well situated about sixty yards away. The epidemic affected twenty-six Mahommedans and only one Hindoo. I have little doubt that the first part of the epidemic was due to accidental infection from the water brought by the women for household purposes. In the latter part of the epidemic the cholera microbe appears to have spread to other wells in the place; but in these cleaner wells the microbe seems to have assumed a less virulent form, for the cases which now affected both men and women in nearly every instance ended in recovery, and on my putting disinfectants into the wells the epidemic ceased.

---

[6] Bhistis are always Mahommedan, and only draw water for Mahommedans or for English people. Hindoos usually draw water for themselves, but sometimes water-drawers are employed. These are always of Brahmin or Cahar castes.

[7] Some details concerning this epidemic will be found in my Annual Report already quoted.

It is commonly supposed that the natives are in the habit of washing their clothes and themselves at the wells, and that the water frequently runs back into the well. This is not quite accurate. Women generally wash themselves either in their houses or in the river, if one is near. Men wash themselves and also their dhoti or loin cloth at the wells, and owing to the platform of the well sloping away from its mouth, very little water, if any, gets back into the well, provided it is in good repair. Clothes, of both men and women, are washed by dhobies, who are never allowed to carry on their business near a well. They are obliged to use either the river or a tank. It is considered that the occupation of dhobies is unclean and consequently they belong to one of the five lower castes who are not allowed to come near a well used by higher castes.

Perhaps the most interesting precaution taken by Hindoos about their drinking water is that those who are supposed to be engaged in dirty occupations, or vessels belonging to such persons, are not allowed to come near a well. In towns and larger villages it sometimes happens that a well is especially reserved for the use of Chamars and sweepers. More generally, if a sweeper wants water, he has to sit down at a distance from the well and wait till some one of higher caste comes and draws water for him.

This does not exhaust the list of precautions taken by natives in this district to insure the purity of their water supply. I was astonished to discover that they take pains to prevent the contamination of the River Jumna. While staying the other day in a bungalow in the Ram Bagh Garden, which is situated above Agra on the banks of the river, a fisherman came to me and complained that my servants had dug a drain from a cook house, and that from it dirty water was running into the river. The servants had made this drain by my orders, as I had a prejudice against the accumulation of stagnant water near to where my food was being prepared. On the fisherman making the complaint I hazarded the statement that it did not matter, since all up the banks of the river everywhere the natives were in the habit of depositing on its banks, as they often did at the margin of a tank, refuse which frequently fell into the water. The fisherman somewhat indignantly denied that this was the case, saying that men who would do such a thing must be of very low caste, and that higher caste people certainly always took pains to prevent the pollution of the river. To this I objected that the natives did not care whether the water was dirty or not, because a mile or two lower down the stream they were bathing at the ghats just where a large drain ran into the river. The fisherman admitted that they did this because their ancestors had always bathed there, but at the same time he said they do not like the drain being run into the river, because the river is holy and they make many prayers to it. It appears to me that this incident well illustrates to what extent with these people of cleanliness is godliness, and tends no make one regret that cleanliness has not been left a matter of common sense, instead of having become incorporated with their religion.

I have only attempted to describe some of the customs of the Hindoos in respect of their supply of drinking water. A further study of their customs would show that, with the higher castes of Hindoos, cleanliness and the avoidance of defilement are virtues to be cultivated in one's self and admired in others. Among the poorer classes and among men of lower castes these hygienic virtues are apt to be tempered with much original sin of the unsanitary kind. But it cannot, I think, be denied, that even when only a few members of higher castes are present in a village they exert a beneficial influence in preserving the supply of drinking water from contamination. Unfortunately, their influence does not go far enough, but it appears to me that this is only a reason for trying to extend it in those directions in which it appears likely to be of use.

The above remarks may seem like a eulogy of the caste system. This is far from my wishes. A system which enjoins that persons who are careful in avoiding defilement should be admired and respected but not imitated, at any rate by part of the population, is far from satisfactory even from the hygienic standpoint. From the ethical standpoint, a system which tends to keep certain classes in a low position and to prevent them from rising to anything higher, no doubt leaves much to be desired. Further, it seems to make no distinction in importance between matters which might be of great use, such as those relating to the water supply, and those of trivial import, such as the position of the cooking vessels while food is being prepared.

THE BACTERIA OF DEAD BODIES.

THIS grewsome subject is treated of in a recent octavo volume of 210 pages by Dr. P. Megnin, a French physician, who shows that it possesses great value. By means of a study of the "fauna of the cadaver" as he calls it, the exact stage of decomposition may be found out and hence the exact time that has elapsed since death—a piece of information on which a man's life often hangs in trials for murder. *The British Medical Journal*, (March 2d) speaks as follows in a notice of the work:

"M. Megnin, who has been for some years associated with M. Brouardel in his medico-legal studies, gives us in this volume the results of his researches into the biology of the various insects found living in dead bodies. As a result of this work, it is now possible to determine in a most accurate manner the time of death of an individual, by an examination of the cadaver and of the successive generations of insects which are found inhabiting it. The author has established the important fact that these successive inhabitants always arrive in the same order from the time of death to that of complete disintegration of the body. He divides this period into eight stages, each characterized by a typical denizen.

"This fact he explains thus: As decomposition proceeds, there is a regular sequence of bacteria as the determining factors. The odor thus evolved, he supposes to be characteristic for each successive stage, and these odors serve to attract the particular fauna diagnostic of each of the eight stages, the members of which thus instinctively know that the body is in a fit state for their reception.

"The importance of this work from a medico-legal point of view can not be overestimated, and that it is capable of practical application the author shows by a number of interesting cases."

Department of Physiological Chemistry.

WITH SPECIAL REFERENCE TO DIETETICS AND NUTRITION IN GENERAL.

Edited by J. HOBART EGBERT, M.D.

DIET AND HEART DISEASE.

IN cases of organic disease of the heart a well chosen dietary exerts a marked influence on the comfort of the patient and, by regulating vital processes and ameliorating concurrent disorders of the system, doubtless prolongs life. In valvular diseases of the heart, so long as compensation is maintained by cardiac enlargement and by measures which augment the portal circulation and sustain the activity of the flow within the capillaries, the patient does not materially suffer from the valvular deficiency and may even be unaware of its existence; but when compensating influences are disturbed or become insufficient and the equilibrium normally existing between the arterial and venous circulations is destroyed, the pressure in the systemic arteries becomes less while that in the veins augments and thus the portal circulation is more or less blocked and the capillaries of the lungs, liver, and stomach are engorged by a back tide of blood. These mechanical effects readily manifest themselves in distressing symptoms. The stomach is deranged, the liver inactive and the bowels more or less constipated. There is usually flatulence, and the urine, at first diminished in quantity and loaded with urates, later on becomes scanty and contains albumen. Respiration is early embarrassed owing to a diminution in the activity of the circulation in the pulmonary capillaries and a loss of oxygen to the general tissues. In advanced stages "shortness of breath" becomes a distressing symptom, while weakness and fatigue follow upon even slight exertion. Coldness and feeble circulation in the extremities, which occur in the early stages of cardiac disease, are likely to be succeeded, in the later stages, by capillary engorgement, dropsical effusion and burning of the feet and hands.

In all cases of organic disease of the heart the matter of diet is of much more importance than is usually believed; in fact, in even the later stages of chronic cardiac affections much relief is often to be obtained by regulating the diet alone. It is at all times essential for the comfort and well-being of those afflicted with heart disease that the food consumed be easy of digestion and of not too bulky a nature, for if the stomach be overloaded or overtaxed distressing flatulence is quite certain to be induced, which directly impedes the action of the heart and renders respiration more laborious. On the other hand, all this can be avoided by taking only such food as is easy of digestion, in comparatively small quantities and at moderate intervals. In the early stages of the disease when compensating changes maintain the general comfort under ordinary circumstances, it will be sufficient to regulate the diet in the following manner: Let the patient divide the amount of food taken daily into four small meals, eating fresh meat only once a day and then only at the chief meal about midday. The quantity of liquid taken at meals should be limited, the evening meal should be very light and everything difficult of digestion should at all times be avoided. Cured meats, pork, salted or smoked fish, lobsters, pastry, rich puddings and made dishes, much or strong tea or coffee, much soup or spiced dishes are to be positively excluded from the dietary. Soup *per se* is very useful in these affections but should be taken in concentrated form in order that too much liquid may not be ingested and flatulency, fullness or other disturbances thereby induced.

In the later stages of chronic heart disease, when the conditions are such as to be plainly manifest, the diet should be selected with the greatest possible care and the times of eating and quantity of food taken at a time carefully regulated. By so doing the patient's comfort can be greatly promoted and his strength sustained. As the process of dressing is now likely to prove fatiguing to the patient, it is well to start the day with a light breakfast in bed. This, taken about 8 A. M., may consist of a lightly boiled egg, or a small piece of broiled or baked white fish, with a slice of dry toast and butter,a small glass of milk or a small cup of tea with plenty of milk in it. If the cooked egg cannot be eaten with relish, it may be taken uncooked beaten up in the milk or tea, and if there is much exhaustion a teaspoonful or two of brandy may be added. The question of stimulants in heart disease resolves itself into a very simple matter, to wit: they are to be used only for definite remedial purpose, either—as is often best—in the sphere of clinical dietetics or as general medicine to be employed only as the actual conditions warrant or direct. Their use may be frequently necessary in the advanced stages of heart disease but they will often require to be guarded and directed in action by the administration of such controlling agents as *digitalis*, *convallaria*, etc. When not indicated by exhaustion or extreme prostration they should always be interdicted, while malt liquors of all kinds must be positively forbidden. In the advanced stages of heart disease among "regular drinkers," good gin frequently proves a suitable stimulant—when one is needed—as it may excite the sluggish kidneys and aid in reducing the dropsical tendencies sometimes so troublesome among this class of patients. A light luncheon should be served about 10:30 or 11 A. M. This may consist of a small amount of concentrated meat or chicken broth, with or without rice or barley, and a small piece of toast; or merely a cup of cocoa or glass of milk, and a biscuit, cracker or corn cake. At about 1:30 P. M. the principal meal of the day should be taken. It may consist of a little light meat, such as a slice or two of roast or boiled mutton, a mutton chop, the wing of a chicken, a small piece of broiled beefsteak or slice of roast beef, together with a small quantity of well cooked green vegetables—peas, string beans, or cauliflower and perhaps a little baked potato—but the quantity must be limited in order to avoid gastric disturbances and flatulence. A little plain milk pudding, a baked apple with plain dressing, a little custard or cornstarch may be taken as dessert. Later in the afternoon a cup of weak tea or cocoa may be taken with a slice of toast and butter, or stale bread and butter. The evening meal should not be eaten later than 7 P. M. and may consist of a lightly boiled or poached egg with toast, or a very small amount of fresh white fish or simply cooked sweet bread. A full evening meal is sure to cause trouble, producing general discomfort, difficult breathing, fullness, flatulence, etc., and hence the necessity for early and light suppers. It is far better to go to bed with the appetite unsatisfied than to endure the ills which certainly conduce to a night's unrest. During the night an egg beaten in a part of a cup of milk, a little malted milk or some beef extract in hot water may fitly be taken.

When dropsy and gastric catarrh complicate matters the necessity for seeking comfort and improvement by regulation of diet is most imperative. Shortness of breath, indigestion, flatulence and thirst are usually troublesome. The bowels remain sluggish, except when aroused to action by cathartics and purgatives; the skin is dry, and the kidneys secrete but small quantities of urine regardless of the fact that the patient may consume more liquids than is usual in health. The comfort to be derived from a dry form of diet and the limitation of the amount of liquids to be taken between meals is unquestionable, although the craving for cooling drafts is at times most trying. The patient should be made to understand that under the conditions of such faulty excretion the free ingestion of fluids is certain to do harm by augmenting the congestion of the internal organs and increasing the anasarca.

Light, nourishing food in small quantities and not too liquid forms, at frequent invals will do far more to sustain the patient's strength and maintain comfort than the taking of larger quantities of hearty food. A full meal cannot be thoroughly digested at one time and even if retained by the weakened, perhaps disordered, stomach, lies heavily for hours causing flatulence, shortness of breath and directly embarrassing the heart's action.

In the development and promotion of heart disease the effects of improper diet and unhygienic practices cannot be disregarded. Heart disease may result directly from heart strain caused by obstructive conditions in the peripheral circulation which, backing up the venous tide, throw an undue amount of strain and labor upon the pumping machinery of the heart. Liver derangement and faulty excretory action of the kidneys thus induce weak and diseased hearts. Hence it is that the excessive consumption of meat has been said to lead to heart disease. Certain it is that to maintain the liver and kidneys in healthful activity should be the aim of all who would possess health, and this can usually be best attained by hygienic practices and the proper regulation of diet—in a word, by healthful living.

For those with organic heart disease who would prolong their lives in comfort, we cannot do better than to suggest its early recognition and appreciation and then point to the valuable rules given by Dr. George Harley: Take exercise without fatigue, nutrition without stimulation, and amusement without excitement. For those, on the other hand, who would avoid wearing out their hearts and rendering them the seat of most serious disease, we must advise a discreet life, temperance in all things, the maintenance of functional health of the liver and kidneys, the avoidance of long-continued mental work and also of the habitual use, even in moderation, of stimulants and the inordinate use of tobacco and of foods rich in nitrogen.

Before dismissing the subject under consideration it seems fitting to call attention to the remarkable success which has been attained in the treatment of aortic aneurism by rest and diet. The object of the treatment is to secure the deposition of fibrin from the blood within the sac of the aneurism and thus effect its obliteration. To this end, the diet must be reduced as far as can be done without impoverishing the blood sufficiently to create systemic disturbances, it must be as dry as possible, must be largely nitrogenous, and be so distributed throughout the day as to minimize the risk of even temporary plethora. The quantity of liquid given during the treatment is practically as little as can be borne by the patient. The proportion of nitrogenous food is made greater than would ordinarily be considered necessary to balance the dietary. in order to aid the coagulation of the blood within the sac of the aneurism and at the same time secure a diet sufficient for the support of the patient. As any approach to acceleration of the circulation is likely to militate against the object in view, only small quantities of food are given at a time, the patient is maintained perfectly quiet in one position and all stimulating foods and beverages are avoided. In cases of extreme prostration it sometimes becomes necessary to allow a very limited quantity of light wine with the food once or twice a day. The plan proposed by Mr. Tufnell and which resulted successfully in ten cases under his care, directs that the patient be kept in bed and at perfect rest in the horizontal position for a period of from eight to thirteen weeks, according to the effect produced upon the aneurism, while every care is taken to avoid movement in bed. Special arrangements are made so that the bowels and bladder may be relieved without altering the position of the body. The only medicines used in the cases reported were occasional opiates and laxatives. In Mr. Tufnell's method, the diet prescribed is as follows: For breakfast, two ounces of white bread with butter and two ounces of cocoa or milk; for dinner, three ounces of meat, three ounces of potato or bread, and four ounces of water or, if indicated by an exhausted condition of the patient, two ounces of claret and two ounces of water; for supper, two ounces of bread and butter, and two ounces of milk or tea—making a total of ten ounces of solids and eight ounces of liquids during the twenty-four hours. This plan is certainly a rigid one but may be carried out with the co-operation of an intelligent patient and a reliable nurse. In some cases it will be found necessary to slightly modify the above plan, in which event the dietary suggested by Dr. R. W. Burnet, of London, should be attempted. Here, as before, the patient must assume the horizontal position and be willing to remain at perfect rest in that position for a period of from two to three months. The dietary is thus arranged: For breakfast, an egg or two ounces of fish, with two ounces of bread and butter, and three ounces of cocoa or milk; for dinner, two ounces of potato, bread, or dry boiled rice, and three ounces of water; five o'clock tea, one ounce of bread and butter with two ounces of cocoa or milk; supper, one egg, one ounce of bread and butter and two ounces of milk —making a total of twelve ounces of solids and ten ounces of liquids for the day. As Dr. Burnet justly observes, a sufficient number of cases of aortic aneurism in which improvement has followed treatment by rest and diet have been reported to render it incumbent on every one placed in charge of such a patient to give this treatment a fair and exhaustive trial.

FOOD TABLETS.

NOT long ago an American chemist, evidently a disciple of Prof. Berthelot, of France, stated that the time was near at hand when hot water and food tablets would be the sole accouterments of a kitchen; that the essential food elements of a twelve-hundred pound steer can be put into an ordinary pill box; and that a single concentrated soup tablet the size of a pea, will make a large bowl of soup of full nourishing strength. A ration case weighing eight ounces was planned. It contained the following supply: Three tablets of concentrated soups, equal to three quarts; four beef tablets, equal to six pounds of the meat; one milk tablet, equal to one pint; two tablets wheaten grits, equal to two pounds; one tablet egg food, equal to twelve eggs.

Viewed from a chemical standpoint it may seem possible to reduce, by condensation, the bulk of man's food almost indefinitely and thus furnish in a thoroughly portable and convenient form nutriment for the body which will remain unchanged through long periods of time and in spite of the influence of varying conditions of temperature and climate; but from a physiological point of view may be seen serious obstacles to the successful consummation of such a proposition. The green plant, aided by the sunlight, may gather its food from simple forms—from the atmosphere, water and soil—but the animal body requires complex and special forms of food for its due nourishment. Man's superior vitality must be fed as well as his muscles and bones, and even the conscious relish of food assists in the performance of its offices in the economy. As the fundamental vital principle which actuates digestion and assimilation and which finds its beginning and perpetuation in life itself, cannot be explained by chemical terminology, neither can the essence, principle or substance present in natural food-stuffs, and which is suitable food for that same vitality which actuates life in man, be isolated by chemists or otherwise separated with certainty from its original combination. That condensed and concentrated foods have a direct sphere of usefulness will not be denied, but that food tablets and similar products are well adapted to constitute the sole food of healthy men for any length of time is an undeniable fallacy. Combined with fresh foods they may yet prove of service for, like the particles of yeast added to the dough, the necessary principle contained in the ordinary food may leaven the whole lump.

But practical experimental evidence is always most convincing and hence we append the following dispatch which recently appeared in a reliable periodical: "A dispatch from Denver was published stating that the troops at Fort Logan have made the first test of the new emergency ration. One company went out for three days of forced marching in the foothills of Denver, loaded with coffee tablets and compressed soup that was supposed to contain all the advantages of hard tack and coffee. On the night of Sept. 11, the medical officer charged with weighing and watching the men rode into Morrison for assistance. He reported that thirty-six out of the fifty men are down with griping pains resulting from the non-assimilation of the scientific ration. The order could not be revoked, and the men in the field were informed that they would have to remain on the march for two days longer."

HIGH PRESSURE PROCESS OF TEACHING IN OUR PUBLIC SCHOOLS CONSIDERED FROM A MEDICAL STANDPOINT.*

By W. H. Short, M. D.
La Grange, Ind.

There are different temperaments and organizations in our school children, and of necessity it would be impossible to adopt any method of teaching that would reach all in a satisfactory manner; no one course or routine would be perfectly satisfactory to the highly nervous child and apply equally to the lymphatic and sanguine temperament. But we ought to be able to so conduct our schools that we may do the greatest good to the whole number.

Our present school system is a high pressure process with a constant tendency to add more branches, so that little children have five or six studies and with department method, as many teachers. Children of eight or nine years of age are urged to high intellectual effort and are expected to master studies which a few years ago were only attempted by children fourteen or fifteen years old. Are we thus doing the best for the coming men and women?

We have certain unmistaken effects among our school children, and there must be a cause. Who originated such an elaborate course and what was the object?

It evidently was not by those who were competent to judge of a growing child's endurance. Writers and publishers of our text-books are influencing our legislatures to inflict such herculean tasks upon the youth of our land. We readily see why this course is being adopted so generally. Shall we stand idly by and allow the children to be thus wrecked mentally and physically?

Can a little child study five or six branches and comprehend them? And if he cannot and is oversensitive, will it not affect his nervous system and secondarily his whole organization?

Can the scholar develop into a well organized being by thus overpowering the child with so much brain work? We have often observed this trying ordeal among the nervous class, during monthly examinations; the scholar becomes restless at night, fails to take sufficient nourishment, becomes constipated, complains of being tired with a constant headache which in its incipiency, is generally relieved by rest and out-door life. There are many causes in and out of

---

*Read in the Section on Diseases of Children at the Forty-seventh Annual Meeting of the American Medical Association, held at Atlanta, Ga., May 5-8. 1896.—*Jour. Am. Med. Assn.*

the school room which have a tendency to increase certain diseases, but our present school system increases nervous diseases with all their horrors, often worse than death, and often close in the wake of disordered nervous systems follow tuberculosis which ends the school work of many who promise so much in early life.

The highly sensitive are in great danger from overwork, while those less susceptible do not worry and thus retain their balance, recuperate and throw off influence of school and studies, as soon as at play. How different with the nervous child, who when overtaxed cannot throw off anxieties and is constantly expending his nervous energy. We first have slight ailments to treat, but soon the child does not recover from his trouble so easily. The headache becomes more persistent until we finally have congestion of brain, epistaxis, increased digestive trouble with more or less anemia. With the child thus affected his work becomes more irksome and he now requires urging to keep up with the classes. Repeated attacks soon produce a weakness of blood vessels and the nerve centers so that slight causes precipitates one of these attacks.

Such children soon become restless and emotional and easily excited or depressed. The girl is now in a condition to be easily afflicted with hysteric troubles which we have so often seen as a climax of school pressure; and the boy thus goaded on does not fare better, for he is in danger of resorting to habits that endanger soul and body.

There can be no doubt that when the sensitive are thus overworked, we frequently have the epileptic trouble developed. Even if we do not have such serious trouble follow, many are so affected that they are unhappy and unable to compete in life's great battle. Many of our school children are obliged to wear glasses and this is largely due to the same high pressure process.

The eye must have rest, and the child who is compelled to work hard during school hours and until late at night is not able to accommodate it. Thus, not only one organ or function becomes involved by this great strain upon the developing child but every part of the organism is not only endangered but many valuable lives sacrificed to satisfy a false delusion called education. With the present tendency to keep on adding more branches each year to our course of study we will have more irritable brains to treat with all its sequelæ.

Have any of our really great and strong men or those who have achieved greatness been thus educated? Some of our greatest men only had a knowledge of the common branches, until well matured, and with some practical knowledge of life, a good physical organization and an abundance of good common sense were enabled to honor the highest positions that fame and fortune could willingly and justly bestow.

The present overpressure process of teaching is having a deleterious effect upon our school children in many ways. Not only is disease thus produced directly but we are injuring their reasoning powers in not allowing them to develop into strong physical beings. A child thus overtaxed may arrive at manhood, or womanhood but will never be able to compete with those who are allowed to develop mentally and physically co-equal. The child who is carefully taught only such branches as his mind can comprehend, and new studies only undertaken when he is competent to understand them will, other things being equal, accomplish more in the literary world or achieve greater success in other spheres of life. He will be saved untold suffering and not become a burden to our commonwealth. If we continue to crowd our children through the public schools without reference to their physical or mental ability we must increase our burdens, for many are drifting into our public institutions for treatment.

If we do not call a halt some will have to seek knowledge in schools for the blind, others find refuge in our asylums for the insane, while we will be obliged to establish an institution for a class of nervous individuals who will become so vacillating and unbalanced, that society will not tolerate them.

We are having more cases of acute tuberculosis among those who are lowered in vitality by this overpressure. They cannot resist or throw off ordinary diseases as they ought. As we observe so many falling by the wayside, unable to complete a satisfactory common school course, owing to our present mode of teaching, we are assured our system is too complicated and obscure, and should be so remedied that all may be enabled to take a course that will fit them for the ordinary vocations of life.

Our teachers should be men and women who understond human nature and be able to develop the scholars' faculties without promise of reward or menace.

The child who is always on a high tension from such influences cannot do good work mentally and is injured physically. If this high pressure process continued through the growing child's education, it must cause a great sacrifice to our coming men and women. While if our school children are developed by a judicious course they will attain the greatest success in the various vocations of life.

As physicians and philanthropists we should interest ourselves in this method of teaching and ascertain if a better way is not feasible; and while trying to remedy this great evil, not lose sight of the many other causes that are working deleterious effects among our school children. We assert that if the children are allowed to develop co-equally physically and mentally, and only as their delicate organizations will permit, they will become stronger men and women and thus help solve one of the great problems of the coming century.

◆

REPORT OF THE COMMITTEE ON ANIMAL DISEASES AND ANIMAL FOOD.*

By D. E. Salmon, D. V. M.,

Chief of the Bureau of Animal Industry, Washington, D. C., Chairman.

Your committee has the honor to report improvement in the conditions obtaining to the United States, relative to the important subject of animal diseases and animal food. Animal diseases are now more intelligently managed by sanitary officers than ever before, and the meat-inspection service has been steadily extended and perfected. In a general way there has, consequently, been satisfactory progress; but we must admit that there is still much to be accomplished in the way of educating the public, and in the application of sanitary science. Your attention is, therefore, invited to a few points which are brought to mind by events occurring during the past year.

Outbreaks of anthrax among the domesticated animals are apparently becoming more frequent. This disease, very common in the old world, has been rare and confined to small areas on this continent. Unfortunately, the contagion, once introduced into a pasture, remains indefinitely. The bacillus forms spores, and these spores may retain their vitality and virulence for many years. During this long and indefinite period they remain in the soil, ready to start up another outbreak when favorable conditions exist. A disease so fatal to man and beast should be promptly repressed whenever it makes its appearance, and precautions observed to prevent infection of new territory.

The presence of this disease has been reported during the year in a number of states, and it is generally found that there has been unpardonable carelessness in reference to the carcasses of animals which have died. Sometimes they have been left in the fields to be devoured by carnivorous insects, mammals and birds; sometimes they have been thrown into streams or ponds; and sometimes they have been buried in the pastures. If the object were to spread and to perpetuate the infection, it would be hardly possible to adopt a more effectual plan. Flies feeding upon the carcasses have their proboscis soiled with infectious material, and when they afterwards puncture the skin of a healthy animal they inoculate the contagion, and the result is an anthrax tumor. Dogs carry parts of the carcasses to distant pastures, and these animals and swine may contract the plague by feeding upon such carcasses. Possibly the spores of the bacilli pass through the intestinal canal of birds and are scattered with their excrement. The germ may multiply in ponds; it is carried by streams; the spores which form in carcasses may be carried to the surface over the pits where these are buried and infect the grass which is growing there.

---

* Read at the Buffalo meeting of the Am. Pub. Health Assn., Sept. 15-18, 1896.—*Jour. Am. Pub. Health Assn.*

To avoid these sources of contagion, the carcasses, which should never be skinned, should be saturated with coal-oil and burned to ashes. Where this method of disposal has been thoroughly enforced, and the animals have been kept away from infected pastures and yards, the outbreaks have been quickly arrested.

New outbreaks are generally due to contagion carried in hides imported for tanning, or in wool brought for manufacturing purposes, or in hay from infected grounds used in packing crockery and glassware. These sources of contagion should be guarded against by proper regulations. The federal government requires disinfection of imported hides from countries known to be infected, but such disinfection is difficult; its efficacy at best, for the destruction of this contagion, is open to question, and there is reason to believe that in exporting countries it is hastily and imperfectly performed.

The waste from tanneries and woolen mills should not be allowed to contaminate pastures, and hay from infected meadows should not be used even for packing. Local health boards must be relied upon to enforce such regulation, and should advise the owners of infected lands, that these may be reclaimed by drainage and cultivation.

The widespread prevalence of tuberculosis among dairy cattle is a subject now receiving serious consideration in various parts of the country. Measures for the eradication of this disease have been undertaken by a few states and by a considerable number of cities. The principal difficulties are due to the magnitude of the work and to the limited number of men who have had sufficient experience in making the tests. The use of tuberculin as a means of diagnosis is increasing, and the accuracy of this test is now thoroughly established by experience. The objections which have been raised to the tuberculin tests by those opposed to any action looking to the control of tuberculosis in cows, have been shown by careful investigation to have little, if any, foundation. In the light of present knowledge, any effort for the eradication of tuberculosis in this field must be regarded as likely to prove ineffectual where the tuberculin test is not made the basis of the diagnosis.

The danger connected with the use of milk from tuberculous herds is emphasized by repeated instances where such milk has infected calves and swine to which it has been fed. When we reflect that in dairy herds from sixty to ninety per cent. of the animals may be tuberculous, it is readily seen that the milk of all large herds in this condition probably contains the bacilli, even though we admit that but a small proportion of affected cows yield infectious milk.

Tuberculous cows and tuberculous swine are often found in the abattoirs of the country, and sometimes there is great reluctance and even refusal on the part of the managers to properly dispose of the carcasses. Your attention was invited a year ago to the importance, and, indeed, the necessity of coöperation between the federal inspectors and the local sanitary authorities in order to properly protect the health of consumers in all parts of the country. The federal law does not give sufficient authority for the destruction, as a food product, of diseased carcasses. It simply prohibits their shipment to other states. The Bureau of Animal Industry has, however, required condemned carcasses to be rendered in the fertilizer tanks, and most establishments have complied with this requirement, rather than have the public know that they would sell diseased and condemned meat to their customers. Occasionally, however, a firm is encountered which has apparently neither regard for the public health nor for its own reputation, and it insists upon its right to sell for local consumption the carcasses that are condemned. In these cases coöperation with the local health boards is invaluable and indispensable. These boards have undoubted authority to condemn and destroy diseased meat, and they can easily make it to the advantage of any abattoir to comply with all reasonable sanitary requirements.

Such coöperation has been more easily secured and more effectual during the past year than ever before, and there are now only a few abattoirs which are disposed to resist the taking of condemned carcasses. These few must be made to realize that the time has passed when diseased meat can be freely sold for human food in this enlightened country. Your committee testifies with great pleasure to the cordial relations which have been established between the Bureau of Animal Industry and the several state and municipal boards of health, and believes that this is largely due to the influence of the American Public Health Association and to the consideration which has been given to this subject at its annual meetings.

It is a duty of this committee at this time to call attention to the subject of rabies or hydrophobia. We have a number of societies in this country which have recently been very active in disseminating the opinion that this disease either does not exist or that if it exists at all it is extremely rare. Unfortunately this opinion has been supported by letters from a number of prominent physicians, which letters have been given wide publicity in the newspapers. The tenor of these letters is to the effect that the writer has been in practice many years without seeing a case of hydrophobia, or that every case resembling this disease which he has seen could be explained upon some other hypothesis. He, therefore, deprecates the rumors and accounts of hydrophobia which appear in the public press, and believes such cases are forms of hysteria more due to fear of hydrophobia than to the absorption of animal virus.

While it is the duty of the physician to discourage exaggerated and sensational stories of disease, it is no less his duty to give the public correct and reliable information. The desirability of guarding the people from unnecessary alarm who are bitten by dogs, many of which are free from rabies, should not prevent us from giving the information required to protect the much greater number who are liable to be bitten by animals which are actually rabid. The chairman of this committee found it desirable some years ago to combat in this Association the views of very worthy gentlemen who believed there was no such disease as the Texas fever of cattle. Today there is no well informed man who would think of contesting the existence of that disease.

Is it reasonable to suppose that a disease which has been known to medical literature for two thousand years, which originates in a certain definite manner, which has specific characters, and which may be inoculated from animal to animal with the greatest certainty can be blotted out and disposed of by the testimony of a few physicians who have never happened to see it? or, who, if they have seen it, have been unable to recognize it? Do we usually build up our science by the observation of men who have never seen the phenomena of which they write and who are confessedly ignorant of the subject?

On this disease we have sufficient positive evidence to establish its existence and characteristics. There are, in addition to the records of the disease in adults, in children, and in animals, caused by the bites of rabid dogs, also inoculation experiments covering a period of three-quarters of a century and including the wonderfully successful investigations of Pasteur. The disease in animals and young children cannot be explained on the hypotheses of lyssophobia or hysteria from fear of the disease. Nor can we accept the statement that a disease with all the characteristics of rabies can be produced in animals by inoculation with inert or other non-specific material. Those who hold that this can be done are apparently unacquainted with the specific characteristics of this disease.

The chairman of this committee had some opportunity to investigate the existence of rabies, more particularly in the District of Columbia, but also in other parts of the country, and instead of finding the disease to be very rare the cases among dogs and cattle have proved more numerous than was expected. It is recommended, therefore, that the measures for reducing the number of worthless dogs be vigorously continued by the numerous boards having jurisdiction, and that when outbreaks of rabies occur, regulations should be made requiring all dogs which are allowed upon the streets to be securely muzzled.

THE DIETETIC TREATMENT OF TUBERCULOSIS.*

By William Henry Porter, M. D.

Tuberculosis, which is the subject that has been chosen for discussion, is not a new theme. Yet this disease is sufficiently frequent and maintains such a high mortality throughout the whole world that we can well afford to discuss its treatment. The dietetic management of the tubercular subject has been emphasized as the chief point for discussion, because it is in this particular line that the largest expectation for recovery can be extended to those who are afflicted with tubercular lesions. Before we can intelligently discuss this problem, however, we must have a clear conception of what tuberculosis is, and also fully comprehend the natural laws that govern its development.

Tuberculosis is no longer regarded as an inherited disease. It is now known that it must always be acquired after birth. This terse statement may be denied by some, but the weight of evidence points so strongly in this direction that we are fully justified in making this assertion. The child may be born with a decidedly low chemical nutritive activity, and its power to resist germ infection will, in consequence, be very slight. This, however, does not constitute tuberculosis. It simply indicates that such a subject has a strong predisposition to become infected easily by the germs of tuberculosis. The nutritive activity of such a subject is in an abnormally low state, so that a suitable soil for the growth of the germs is easily produced by the slightest errors in diet. Slight causes will produce a break in the continuity of the integument or mucous membrane, thus enabling the germs to gain access to the system at a time when it has not the nutritive activity to resist their damaging effects. When this has been accomplished the individual can truly be said to have tuberculosis, but not before.

As the lowering of the chemico-physiological forces plays such a large part in the production of this much-dreaded disease, and as errors in diet are so largely responsible for the deteriorated condition of the system, we are justified in assuming that the predisposition to tuberculosis can be bred and fed into a family, or, on the other hand, that the same can be bred and fed out of a family. If the parents are of reasonably sound habit; if they are so placed in life that they can live under proper hygienic conditions; and if they confine their diet to that which is plain, easily digested, and yet highly nutritious in quality—other things being equal, their offsprings will be possessed of a higher chemico-nutritive vitality than when these conditions are reversed. They will have a high resistance not only against tuberculosis, but against all forms of infection. Therefore we are in duty bound, as guardians of the public health, to try in every way possible to educate the human race to be more careful in the selection of their life partners. Theoretically both parties should be carefully examined by competent physicians before being allowed to close the final contract. If such rules, as are carefully followed in the mating of the lower animals, were applied to the mating of the human species, one great factor in the predisposition to disease would at once be removed.

Every one must realize fully, however, that such radical measures cannot be applied at once to this vital problem, but a great deal can be accomplished in the line of progressive education on this subject if every physician performs his full duty. When man is more universally mated in accordance with these ideal standards the problem will not yet be fully solved, but rather just begun. It would still remain to exercise the greatest of care in the selection of a proper diet and in the establishment of perfect sanitary surroundings. This is especially true as to the mother during the child-bearing period of life, if strong and healthy children are to be produced. Too little thought is given to this important question, consequently too many children are brought into this world with an enfeebled constitution when they might, with little care on the part of their parents, have been born strong and robust.

---

* Read before the Rutland (Vt.) County Medical Society and printed in the *American Medico-Surgical Bulletin.*

Taking this view of the subject, the treatment of tuberculosis resolves itself into two distinct divisions: The preventive treatment, and the management of the disease after it has been fully established.

The practical condition, however, which we are more frequently called upon to contend with is the management of children that have been born of unwisely mated parents, primarily healthy, but who have been poorly fed, overworked, and compelled to live in unsanitary surroundings during the child-bearing period. In either instance the offspring is apt to be brought into this world in a low state of chemico-physiological activity. And yet, as we study Nature closely, it becomes apparent that the nutritive vitality of the infant in utero is, as a rule, conserved at the value of the mother's nutrition. Thus it not infrequently happens that a fairly healthy child is produced by a weak and enfeebled mother. In such instances the mother certainly is not a fit subject to nurse her offspring, or, if allowed to do so at all, it should be for a very brief space of time.

Viewed in this light, the proper feeding of the mother and newly born babe is of the utmost importance, if we expect to reduce, in any appreciable degree, the number of tubercular subjects developing among the human race. During the child-bearing period the mother should be kept upon a well-regulated, mixed diet, but one in which the animal proteids predominate, because this class of proteids always yields the largest nutritive return with the smallest expenditure of digestive and assimilative energy. This accomplished, both the mother and the child, assuming that the hygienic conditions are good, will develop and maintain the highest possible nutritive standard. There will be produced also, the greatest power on the part of the system to resist infections of all kinds, including the tubercular. The mother under such conditions will, in all probability, have a full supply of milk, and of a good quality. Under these circumstances she is a fit subject to nurse her own offspring and under no other. The nursing period, however, should never be too long extended. It is now well established that milk contains too low a percentage of nucleo-albumin for the production of the best quality of blood. Therefore, a protracted nursing period has a tendency to develop an anemic child as the months advance. This is one of the strongest arguments possible against the protracted use of milk to the exclusion of all other kinds of food-stuffs.

When the mother is not in the requisite physiological condition to be allowed to nurse her offspring, or the time has arrived when the child must be weaned, cows' milk should be substituted for the mother's milk rather than some one or other of the innumerable artificial foods, all of which are said to be far superior to those that are produced in and by the laboratory of Nature. A child that cannot be made to thrive upon a good quality of cows' milk, properly sterilized and diluted, or to which a suitable amount of egg-water or barley-water has also been added, will in all probability, become a fit subject for tubercular infection.

As the child advances in age the diet must be enlarged by the addition of soups and beef broths, then by more solid food-stuffs, such as eggs, meats, bread, and butter, and a moderate quantity, judiciously selected, of vegetable food. It should always be borne in mind, in this connection, that the animal proteid is the most economical to the system, and that when the quantity is properly adjusted together with the limited use of the vegetable class of food-stuffs, it will invariably yield the highest nutritive force attainable. These same rigid rules regulating the diet, both as regards quality and especially quantity, should be maintained throughout life. If, as time goes on, we are successful in accomplishing all that has here been outlined, the predisposition to acquire tuberculosis will, in a large measure, be bred and fed out of the human species.

Having failed to prevent a tubercular infection, we are brought directly to the consideration of what tuberculosis is and how best to manage the disease when it is fully established within the system. We have already seen that the nutritive activity of the system must be considerably reduced or deteriorated before a suitable soil can be produced on which the tubercle bacilli can find a medium for their growth. Having gained entrance to the system and reached a spot that is favorable to its existence, the tubercle bacillus acts as a foreign body and as an irritant. Nature at once attempts to encapsulate these little micro-organisms by throwing out a number of small round cells or leucocytes, thus building up around each point where the bacilli have lodged a little mass of newly formed cells. These cells, in some instances, become matted together, forming a giant cell, while in other instances they assume a recticulated structure, and then resemble strongly the so-called adenoid tissue. These masses when separated and distinct form the miliary tubercle, but when they become massed together or surrounded with the various products of an inflammatory process, there are produced the multitudinous lesions that are found at the necropsy. To these multiple lesions the broad term phthisis or consumption is applied, while the term tuberculosis is more strictly confined to the localized ellular proliferation by which Nature makes the unsuccessful attempt to encapsulate the invading bacilli.

Owing to the low nutritive state of the system the attempted reparative action results in the development of this non-vascular cellular proliferation, in the center of which we find the tubercle bacilli in a state of active growth and multiplication. Whenever the general nutritive activity of the system is sufficiently strong this cellular proliferation will completely encapsulate the bacilli and their toxic products. When this occurs the germ dies from the direct action or poisonous effects of its own toxin. Added to this is the destruction of the suitable soil for the growth of the bacilli. In either case, or by the combined action of the two processes, the bacilli are destroyed and the patient is cured of the tuberculosis. On the other hand, when the nutritive activity of the system is deteriorated, the cellular proliferation is unable to support itself and resist at the same time the damaging effects of the bacilli and their toxins. Consequently the attempt on the part of Nature to guard the system against the damaging or injurious effect of the bacilli fail. When this happens the central portion of the miliary tubercle becomes liquefied, the peripheral cells soon give way, and the bacilli and the toxins are diffused throughout the various structures immediately adjacent to the tubercle. By the breaking down of one tubercle after another the bacilli may ultimately be diffused throughout the whole body.

When the bacilli and their toxins reach the tissues in this manner they act as a foreign body and injure the surrounding structures, and in this manner excite a secondary inflammation, which is usually a low type of activity and easily tends to break down. In other instances, where the nutritive activity is of a little higher grade, and yet not sufficiently high for a complete reparative action, the bacilli find a lodgment at a new point, and another attempt at encapsulation is undertaken, thus producing another crop of tubercles, as it were. These break down in the same manner as those that preceded them, resulting again in a failure to bring about repair.

If the bacilli have found lodgment in the deeper structures, as in the lymphatic glands or in the bones, Nature may for a long time be comparatively successful in her attempts to localize the process. In many cases of this kind if the infected zone is completely removed by the knife, care being taken not to reinfect the tissues at time of the operation, if the removal is followed by the requisite dietetic régime and hygienic régime a general tuberculosis can be prevented. On the other hand, when the primary infection is located in the lungs, where it cannot be attacked by the knife, and where the breaking down of the tissues readily establishes an open wound that cannot be treated antiseptically, we find that this wound in the lung tissue is quickly infected secondarily by the streptococcus. When this occurs a truly septic condition is quickly established and a decided rise in the bodily temperature becomes a marked feature of the disease; while a simple, uncomplicated infection, and one in which the pathological process is confined to a comparatively small area, may continue for many months with scarcely any rise in the temperature.

The only evidence that these cases give of the existence in the system of a tubercular process is a slight, progressive deterioration in the general systemic activity, loss of appetite, a slight cough, with perhaps little or no sputum, but when this little is carefully examined it is found to contain the tubercle bacilli in varying quantities. In these instances a careful physical examination will reveal usually some evidence of an apical infiltration. There will be a slight dullness on percussion, a little roughness in the vesicular murmur, and an occasional râle.

At this point it may be well to mention the fact that any of the acute infectious diseases may be the exciting cause in lowering the nutritive activity, thus establishing a predisposition on the part of an otherwise healthy system to acquire tuberculosis. This is very frequently verified in connection with measles and occasionally in pneumonia and some of the other inflammatory affections of the air passages.

With this picture of tuberculosis clearly in mind, it must be apparent that medicine *per se* is going to be of very little avail directly in the treatment and cure of this disease. In all cases of tuberculosis, excepting the few instances that are localized and within easy reach of the surgeon's knife, very little can be accomplished in the line of the destruction and complete removal of the bacilli from the system. Therefore in the cases of tuberculosis that fall into the hands of the physician for treatment, as contrasted with the surgeon, there is very little that can be accomplished in the line of antiseptic treatment.

Medicated sprays and inhalations are in the strict scientific interpretation practically frauds and delusions so far as their antiseptic and curative powers are concerned. This class of remedies may in some instances excite a little more bronchial secretion and give a little more vigor to the cough. When this occurs they may favor a little more rapid and complete elimination of the pathological products from the bronchial tubes and air vesicles. If they succeed in any measure in bringing about such a result they are of just so much value.

The same may be said of cough mixtures in general. If they aid in more rapidly eliminating the inflammatory products from the air passages they do good; or if they hold in check a harassing cough that is exhausting rapidly the little energy that the poor patient has they are of value.

Creosote in some instances appears to alleviate the cough better than anything else. But it is now quite conclusively proved that creosote has absolutely no antiseptic or curative action upon the tubercular process as met with in the lungs. The promiscuous and wholesale administration of this drug has often been the means of destroying the little appetite and digestive action that the poor patients have left. It probably has and is continually doing more harm than it can possibly, under the most favorable circumstance, be made to do good.

Cod-liver oil is another substance that has been and still is much used in the treatment of tuberculosis. It has been claimed that it was a great nutritive substance and tissue builder, while in reality it is not in any sense a tissue-builder, but simply a heat producer. And, as the patient can get all the heat-producing food that is required in a much more available form, cod-liver oil should not be exhibited to these patients. Again, it tends to destroy what little appetite and digestive function they have left, and in this way it destroys the only chance they have to establish a higher grade of nutritive action. So that, like creosote, the cod-liver oil does more harm than good in these cases.

In a similar manner we might go over the long list of drugs, etc., that have been recommended and lauded to the skies as being absolutely curative, and point out that each one has proved itself an absolute failure. Nor is there any wonder that it should be so, when we understand fully the etiological factors that enter into the production of this disease. If we could destroy the bacilli that have already gained access to the system, this even would not prevent a reinfection at the first moment that our antiseptic precautions failed to be absolutely complete. Therefore it is a waste of valuable time to discuss the so-called antiseptic treatment of tuberculosis in general. This statement does not of course apply to surgical tuberculosis.

What must be accomplished if success is to crown our efforts to decrease the liability to acquire the disease and to cure it if developed is the forced development of a higher nutritive standard. To secure the best results we must, as already stated, go back a generation and guard carefully the mating of the human species, so that the possibility of producing healthy offspring will be augmented to the highest degree. Then the diet of the mother and child must be regulated in accord with reasonable scientific principles. The whole race must be educated as to how and what they should eat. Briefly stated, it may be summed up as follows: A well-regulated mixed diet is the ideal one for general use, but in it the animal proteids should predominate, and vegetables and fruits should be used in great moderation. With this all excesses should be avoided and the most perfect hygienic surroundings possible secured.

Dealing directly with the tubercular subject, the first question that confronts us is how are we to encourage the appetite and maintain a forced nutrition. The first problem can be solved in a measure by having the patient seek that climate which is the most equitable, and one in which the subject can be more or less continuously in the open air. The country and the high altitudes should be selected in preference to a city life or the low lands, the inland rather than the seacoast. It is in these localities that we are the most likely to secure a pure and dry atmosphere. Such an atmosphere, especially in the region of the pine forests, is the only available antiseptic that can be used to practical advantage in dealing with these cases.

In the tubercular subject the volume of blood is apt to be decreased and its quality impaired. In this weakened and generally relaxed condition the surface or systemic blood-vessels are liable to be unduly expanded. This condition tends to draw a considerable portion of the blood away from the deeper or visceral organs, such as the lungs, the digestive system, the liver, and the kidneys. When this occurs it interferes with oxidation and the digestive processes. In the high and dry altitudes the surface-vessels are contracted and a larger volume of blood passes through the lungs, the digestive organs, the liver and kidneys, thus augmenting glandular action and the oxygenating action of the system. This naturally increases the nutritive action of the physiological economy and intensifies greatly its general and local reparative powers.

Every tubercular subject fails to produce sufficient hydrochloric acid to properly peptonize the proteids. Therefore these subjects should always be given a small quantity of this mineral acid to aid the enfeebled digestive system. This alone will often promote a better appetite, and it greatly aids in the process of forcing the nutrition. The appetite can often be improved by the judicious exhibition of the bitter tonics, the alcoholic beverages in moderation, by the use of quinine, iron, and strychnine. All these are used, not for their curative action on the disease, but to improve the appetite and augment the digestive powers of the enfeebled system. The intestinal digestion can be artificially improved by the administration of fel bovis inspissatum, the pancreatic extracts, and the caffeine salts. The diet must be confined almost exclusively to the animal proteids and a very moderate use of the vegetable class of foodstuffs. Milk, eggs, beef, and mutton must be the sheet anchors, if we would increase nutritive activity and forcibly produce an active reparative process. Food must be administered with as much systematic regularity as the medicine, and in fact more so, and it must also be taken in sufficient quantity to both sustain life and repair the damage that the system has already sustained.

When this forced plan of dieting is successfully established early in the disease, and is persistently pursued, and the patient can be made to take plenty of out-door exercise, many cases gain rapidly until a complete cure is fully established.

THE SUNDAY PENALTY OF IRREGULAR FEEDING.

THE American people pride themselves on being enlightened and highly civilized, using their reasoning powers to such advantage that by systems of quarantine, vaccination, etc., they are able to exclude or control almost all epidemics of infectious diseases. These intelligent people would resent a statement that in some of their routine customs they were only slightly above the level ot barbarians, yet the unhappy truth remains that such a statement may be made without fear of refutation.

In our evolution from barbarism we have created or established a race of people with whom regularity in eating and sleeping is the fundamental essential to good health. The digestive secretions are poured out and ready for action with the regularity of clock-work, so that a man can tell by his feelings almost the minute at which his dinner hour comes. If this regularity, so long established, is violated, and the regular dinner hour is past without food being ingested, the violator not only suffers bodily discomfort, but an actual injury occurs to the digestive apparatus. The stomach and other secretory organs resemble the muscular system in a certain degree, as they must have a certain amount of work to perform in order to keep in the best working condition. Also, like the muscular system, overexertion leads to disorder, and disuse invites a variety of pathological conditions. But, unlike the muscular system, the digestive organs have been so educated by custom that they require, not only a definite amount of work to perform, but an absolute regularity in the time of performing that work. The gourmand who overtaxes his stomach is certain to meet his retribution. The drunkard who stimulates the mucous membrane of his stomach with alcohol and gives his secretions nothing to act upon in the way of solid food, finds shortly that his stomach refuses to secrete at all, as just punishment for his abuse and negligence. Almost as certain a result, if not so rapid, is sure to follow indiscretions of irregularity in eating. The stomach, having poured out its secretions at the customary time, waits only a short time before it allows such secretions to be absorbed without the accompanying production of nutritious pabulum that goes to assist in the formation of more secretions. After a few such experiences the secretions become less in amount and in activity, even when food is introduced into the digestive tract, and we have resulting indigestion, so common in all communities.

The dyspeptic is cautioned and advised by his physician to take his meals at absolutely regular intervals, not only as a treatment of existing evils but as prophylactic against future disorders. One indiscretion of irregularity in such cases often causes the patient a week of misery. If this regimen is a standard prophylactic with confirmed dyspeptics, how much should any one in our artificial civilization allow himself to deviate from so simple a rule, when an absolutely normal stomach, at all times is almost unknown?

Yet this very invitation to gastric disorders is issued every seventh day by ninety-nine per cent. of the people of this country. Once in seven days comes our so-called day of "rest"—the day on which the three regular meals at morning, noon and night are replaced by a vicious system of late rising and abstinence, followed by gluttony. The gastric secretions know nothing of a seventh day of rest. They are ready at the customary six-day morning-breakfast time, but no food comes to them and they are absorbed. A second period of the day comes and the same process is repeated, with the additional injury that from two to four hours after the customary meal the stomach is loaded unusually full of food, whereas the secretion is no longer there in sufficient quantity to digest it. The result is the regulation Sunday afternoon discomfort or gourmandizing, with the accompanying absence of appetite for the evening meal. What wonder that the following day is "Blue Monday."—*Medical Record.*

TOXICITY OF THE GASTRIC JUICE IN EPILEPTICS.

SINCE the publication of Bouchard's memorable work, "Les Auto-Intoxications," many investigations have been made which point strongly toward the toxic origin of epileptic paroxysms, at least in cases of idiopathic epilepsy. Numerous examinations of urine have been made in epileptics, with the result that a high toxicity has been found. In one case investigated by the writer, the toxicity of the urine of a patient just recovering from a succession of epileptic paroxysms was found to be more than double the normal; the animal injected with it died in most powerful epileptic form convulsions.

Augustini has recently investigated the toxicity of the gastric juice in a case of epilepsy. He found that the gastric juice of the epileptic, when injected into the abdomen of a rabbit, proved fatal, with general toxic symptoms and chronic convulsions. This was found to be especially true when the gastric juice was obtained immediately before or after an attack. Normal gastric juice was found to produce no such evil effects. Augustini concludes from these experiments that systematic lavage, or washing of the stomach, and disinfection of the intestines by an aseptic dietary and other appropriate measures, are indicated in all cases of epilepsy.

These observations agree entirely with the clinical observations made many years ago, and specialists in this class of disorders have long taught that abstinence from flesh-eating was essential in the treatment of epilepsy. Bouchard showed that the toxicity of the intestinal contents is doubled when meat enters largely into the dietary. By withholding flesh food, and confining the patient to a diet of fruits, grains, and other vegetable products, with a moderate allowance of milk, the alimentary canal may be rendered comparatively free from germs and the toxins which are the result of bacterial growth.

These facts carry with them the suggestion that the septic condition of the alimentary canal resulting from the use of flesh food may be responsible for many other nervous disorders besides epilepsy, and that a vegetarian regimen, as ordered by the late Professor Dujardin-Beaumetz, of Paris, may be advantageously adopted in a large class of chronic disorders.—*Selected.*

Department of Hygiene.

WITH SPECIAL REFERENCE TO STATE AND PREVENTIVE MEDICINE.

Edited by HENRY LEFFMANN, M.D.

OUR DAILY BREAD.

IT IS not necessary to begin a discussion of the sanitary relations of bread-making by the presentation of statistics as to the number of tons of bread annually consumed among civilized peoples. It will be conceded that it is an article of food of prime importance, and that anything that tends to diminish its wholesomeness must have a most widespread influence.

Many points of interest to the sanitarian are to be noted in connection with this topic. In the first place, flour may be quite unfit for use through the presence of fungus growths affecting the seed. Ergot, the well-known disease of rye, is capable of producing a peculiar chronic gangrene, and epidemics of such a disease have been produced by the use of flour made from rye affected by this fungus. Other cereals are liable to similar diseases.

Minute amounts of copper are not unfrequently found in wheat-flour, but there is little cause for alarm on this point, since it seems that copper is not distinctly a cumulative poison.

K. B. Lehman, of Würzburg, has recently published elaborate observations on the sanitary relations of copper, the details of which we will discuss further in a later issue. He has, among other points, made analysis of the tissues of wild plants growing in soil known to contain copper compounds. He found small amounts of copper in many plants. He also found the metal in minute amount in the viscera of some animals that had been raised in the district.

We hear, also, from time to time of the use of alum in flour and of its possible harmfulness, but the danger from this source has doubtless been overrated. The question will be further discussed in connection with use of alum baking-powders.

Unwholesomeness in bread seems to be more likely to arise in connection with the methods of making it than with the accidental or intentional adulteration of the raw materials. Articles of this class are required to be "light" in order to be palatable, this lightness being simply an inflation of the dough by gas. From a remote period, mankind has obtained this by the use of yeast. The general manner of action of yeast is pretty well understood; it acts by fermenting the starchy matters so that alcohol and carbon dioxid (commonly but erroneously called carbonic acid) is produced. The alcohol is formed in but small amount, yet a proposition was once made to recover it from the bread, since it is nearly all expelled in the baking. The enterprise was not a commercial success, and it is said that a certain baker sought to secure attention to his own products in competition with the company's bread by advertising "bread with the gin in it." The baking of the bread expands the gas during the fermentation and thus the necessary lightness or porosity is obtained.

Ordinary yeast is a miscellaneous mixture of fungi. There are many species of yeast-fungi proper, and with them are usually associated many species of bacteria. Each species has its own fermentations, hence the total result varies with the composition of the yeast. In brewing it is of so much importance to control the fermentation exactly that pure cultures of yeast, prepared with considerable care, are now used, but in bread-making no such exactness has been developed. It is found, therefore, that there is some variation in the flavor and quality of bread, and this depends in part on the nature of the yeast. It is obvious that an article of so mixed a nature as yeast must introduce a variety of microbes into the bread. It is generally supposed that all danger from this source is avoided by the baking, which is assumed to sterilize the bread. Experiment shows, however, this is not always the case. Some investigations made in England not long ago proved that the interior portions of well-baked loaves contained living microbes. It is, indeed, now well-known, that several species of bacteria have high resisting power to heat, withstanding even the action of water boiling at ordinary pressure, for several minutes. Spores, especially have high resistance. Fortunately most of these obstinate bacteria are not distinctly disease-producing.

It follows, therefore, that the process of baking bread cannot be implicitly relied upon to render bread sterile. We may dismiss the question of adventitious fungi in the yeast as being rather technical in interest, the danger of introducing disease-producing microbes being slight, but we cannot dismiss the consideration of the danger from infection by the unsanitary conditions and surroundings of bake-shops. Attention has already been called to this topic in several cities. It is a matter of common observation that the sights in the interior of bake-shops are not always appetizing, particularly during busy hours. The "sweat of the brow" is not infrequently directly incorporated into the bread. Basement bake-shops are very common and vermin must be abundant in them. It has been shown in certain trade agitations that journeymen bakers have hard work and not good pay, and such conditions tend to degrade the sanitary character of workmen.

Bread-making should be carried on by machinery in large establishments. By this means all contact with human hands may be avoided. Light and ventilation can be secured, and vermin may be reduced to a minimum. The raising of the dough can be brought about by the introduction of a pure carbon dioxid, or if this be deemed unsatisfactory, pure yeast cultures may be employed. Such establishments are largely subject to sanitary control without involving the inquisitorial feature that attaches to visits to private shops.

It will not be inopportune to discuss briefly the matter of baking powder. Much has been said on this topic, but very little is scientific. It is generally known that three classes of substances may be employed for the "acid" portion of baking powder, viz., cream of tartar, alum and phosphates. Alum has been an object of criticism for years, but it does not seem that anything definite has been deduced from the experiments. As used in baking powder it is completely decomposed in the act of mixing it with the moist dough so that no inference drawn from its physiologic effects *as alum* can be applied to its use in baking powder. To our mind there is little choice between the three forms of baking-powder. All are inferior to the direct inflation of the dough by pure carbon dioxid, and it will be a great advance in bread and cake-baking when such a method becomes universally employed.

METALLIC CONTAMINATIONS OF FOOD.

It has long been known that the compound of lead, mercury and arsenic are distinctly cumulative, that is, that the continued introduction of very small doses into the system will ultimately develop a profound poisoning. Sanitary authorities, therefore, have not hesitated to condemn such substances and to prohibit the sale of goods containing appreciable amounts of them. Less positiveness, however, attach to the question of the effects of tin, copper and zinc. It is known, that in large doses, the compounds of those elements are distinctly poisonous, but the action is generally a direct irritation or corrosion. Moreover, compound of mercury and arsenic are mostly highly poisonous in small doses, a few grains being sufficient to produce a fatal result, while those of tin, copper or zinc are much less active.

Tin does not seem to be of much importance in a sanitary point of view. It is frequently present in small amounts in canned goods, but there are no data to show how far it is dangerous, and sanitary authorities have generally wholly ignored it. Copper has been studied much more closely. It is frequently present in both plants and animals, which is not the case with any of the metals mentioned above. It is often found in the human liver. Some years ago the question of allowing the sale of peas, artificially colored with copper, was discussed at considerable length by French sanitarians, and it seemed impossible to produce positive evidence of injury by the use of food containing minute quantities of this metal. It was clearly evident, however, that the Frenchmen were not unwilling to allow the peas to be exported without special supervision, but were anxious to protect their own people by requiring the label to give notice as to the color used. Several of the United States have adopted the plan of allowing these articles to be sold provided a label is affixed stating that a coloring matter has been used.

Interest in the general question has been again revived by the agitation concerning the presence of zinc in dried fruits, especially in the so-called "evaporated apples." This contamination arises from the use of drying-trays made of galvanized iron wire. The apples are subjected to the fumes of burning sulphur previous to drying; the small amount of acid thus introduced probably increases the corrosive action in the drying-trays.

American evaporated apples find a large sale in Germany and compete successfully with the native products. This led to efforts to restrain importation, advantage being taken of the presence of zinc, which is alleged to render the product unwholesome. The restrictive regulations thus established have necessitated an official investigation on the part of United States Government, the results of which are set forth in Bulletin No. 48 of the U. S. Dep. of Agriculture, from which we abstract some interesting data. Lattimore, in 1886, made examinations of many samples of evaporated apples but found no zinc in them. In 1889 Cornwall examined eighteen samples and found small amounts in twelve, the highest proportion being 0.18 per cent. of metallic zinc. The U. S. Department of Agriculture obtained samples of apples from exporters and—through the U. S. Consular agents—portions of samples which had been condemned by the German authorities. The results of analyses show some variations in the proportion of zinc but it is always small. The largest proportion was 34.8 milligrams (about ½ grain) to 100 grams of the fruit in its commercial condition. In one sample which had been condemned by the German authorities, no zinc was found by the analysts of the Department of Agriculture.

In summarizing the results of the investigation it is pointed out that it is not impossible that fruit grown in soil containing zinc might take up traces of the element, but in the cases so far examined, the zinc has been introduced by the galvanized-iron trays. While there is no positive evidence that zinc in minute quantities will cause poisonous action by accumulation in the system, yet in the interest of sanitary reform and to avoid any technical objection to American products, the manufacturers should discontinue the use of galvanized wire, substituting therefore aluminum or well tinned iron wire. Experiment has shown that aluminum wire will answer and there could be no sanitary objections to a minute amount of aluminum, since that is a normal ingredient of all fruits.

It is estimated that the 'quantity of zinc which could be taken by a person at an ordinary meal at which these apples are served would not exceed two-fifths of a grain. Zinc is known to be distinctly less poisonous than copper, and hence it is probable that the quantity is without marked action even when repeatedly consumed. Still the effort should be made to prevent the presence of even this small amount.

We are rather amused at the statement that the evaporated apples have a tonic value "due to the iron they contain, which is probably derived from the machines used for cutting them," but we suppose that what Sir Joseph Porter said about England is true of our own land, namely, that it is "the characteristic of this happy country that official utterances are regarded as unanswerable."

◆

A COMPLAINT AGAINST THE PARIS PASTEUR INSTITUTE.

It is well-known says the *Paris 'Medical Journal*, that for several years now the Pasteur Institute has been a commercial establishment, a sort of factory for pharmaceutical products intended for subcutaneous employment. In the rue Dutot, they sell viruses against diphtheria, against puerperal fever, etc.; furthermore, the establishment has obtained the monopoly of the manufacture of these various products. It is not generally known, however, that the institute has extended its operations and now makes also viruses for the destruction of injurious animals, such as insects. Danysz, a learned foreigner, attached to the concern, has just discovered a virus sure to kill rats and mice, but the system, cried up with the usual flourish of trumpets, has not given the results expected of it.

Eloire, a veterinarian, has published in an Amiens agricultural newspaper an article in which he states with regret that he has carried out the Danysz process conscientiously and has failed completely. Moreover, he declares that viruses prepared in the institute and intended to be used as preventives of diseases of animals have proved equally inefficacious. This is not the first time, he says, that there has been reason to complain of the products of the establishment founded by the lamented Pasteur. The chicken-cholera "vaccine" was only the starting point of gross errors, and they have returned to it. The rabbit cholera made a complete failure in Australia in the hands of Loir, a pupil and relation of the master, and last year the anthrax "vaccine', caused Eloire very serious disappointments so that the mortality in the herd kept on after the inoculation quite the same as before it.

Eloire promises to recur to this highly interesting matter at some future time. In the meantime he remarks that the preventive inoculation of rabies leaves so much to be desired that it is not worth while to insist on it. As for the Danysz viruses, he says, they are a continuance of the unfortunate series of uncontrolled preparations sold for their weight in gold and not worth a nail. He protests that he is far from denying the discoveries of the illustrious master of French science; on the contrary, he says he is one of the constant patrons of the "vaccine-mill," and it is precisely in this capacity that he finds the products of the institute too often lacking in the quality that one has the right to expect in articles obtained from such a source. Etiquette, he adds, is sometimes of no value.

Our Paris contemporary declares that this accusation comes from too good a source not too find an echo in the medical and veterinary world, and it reminds Roux and Duclaux, the successors of the illustrious founder, that they have a serious duty to fulfill, in which it hopes they will not fail. —*New York Medical Journal.*

◆

CONTAGION LURKS IN THE CUP.

The Superintendent of the Bureau of Contagious Diseases in the city of Newark, N. J., Dr. Frank P. Connelly, has recommended to the health board of that city the removal of the drinking-cups and dippers now in use, in common, by the school children there, and the requirement that each child shall furnish a cup or glass for his own use. While this reform is urged because of the fear of the spread of diphtheria throughout that city, it is based on a recognized principle which underlies similar action taken in this city for general protection some time since. New York has also abolished in the public schools the infected sponge and slate, and thus removed the temptation for the use and possible transfer of saliva by the scholars. The throat specialists have warned us repeatedly of the danger of the common cup, especially the tin cup with a rim made by turning the edge of the cup over a wire ring. In the dark recess thus formed there is an admirable moist nidus for the encourgement of a crop of bacteria. *Syphilis insontium* has been traced to such a source, as well as diphtheria, and probably cases of epidemic influenza, suppurative tonsilitis, and tuberculosis have had the same origin in many obscure instances.

Several church societies have adopted the separate communion cup, and no longer offer the symbolic wine of the Eucharist in a chalice that passes from lip to lip among a hundred communicants. On the same principle, a united effort should be made to abolish the common drinking cup in railway cars, in ferry houses, and at street fountains. Cursory examination of these public vessels will reveal a thin layer of slime covering the surface of the cup, composed partly of dust, partly of sediment from the water, partly from mucus, perhaps. No ordinary rinsing. especially with ice water, will cleanse such a cup. Yet fastidious people will very thoughtlessly use it, if thirsty. It does not require a very inventive mind to suggest that there be a slot machine near each water tank in public places, from which he who cares for cleanliness or safety can obtain a clean cup made of wood-pulp, on the insertion of a cent in the slot. Were there no drinking vessels supplied in the railway cars, the traveler would learn very speedily to provide his own collapsible cup. But at all events he should not be allowed to infect himself or leave infection for others through the employment of a public vessel.

Solomon said: "Look not thou upon the wine when it is red, when it giveth his color in the cup, when it moveth itself aright." *Sanitas*, of to-day, adds: "Drink not thou of the cup in which the bacilli stand, or the cocci roll, or the vibriones wave."—*Amer. Med.-Surg. Bull.*

UNCLEAN BAKERIES.

It may surprise many people to learn that the dirty bakery has been the rule rather than the exception. In all the large cities of the country health authorities have for years been fully informed of the fact that dirty bakeries are very numerous. Every sort of obstruction has been placed in the path of those who have tried to have them made clean and tidy. The Board of Health of San Francisco has taken up this subject and is making vigorous efforts to remedy the evil. Could the consumers of bread and pastry but see the places where the baking is done, and the manner in which it is done, they would be so disgusted that they would hardly care to eat any food from bakeries. The indifference of the public to their own health is something astonishing. There cannot be a single family living in this city that has not heard of Dockery and the work he and the Board of Health are doing to compel dairymen to give pure milk to their consumers. Yet in face of this fact every scoundrelly milk peddler who drives in town with poisoned milk has no difficulty in selling every drop to consumers. We can hardly expect that the average person will be any more concerned about the purity of the bread he eats than of the milk he or his children drink. Fortunately, bakeries are easily located, and inspectors can look them over without much trouble. In this matter the Board of Health will not be so handicapped as they have been in keeping out impure milk. Already a favorable change can be seen in the cleanliness of some of the bakeries. Every bakery which persists in keeping its place dirty should be reported. Fear of loss of custom through public exposure will soon bring such proprietors to terms. In the absence of any laws on the subject of bakeries, this method will be the only way to compel a reform. The next legislature will probably pass the necessary laws, in the meantime the Board can compel a thorough cleaning of these foul spots.—*Pacific Medical Journal.*

EXPECTORATION IN CONSUMPTION.

It was very clearly shown a few years ago by certain careful observers that consumptives are liable to cause a health resort to become a dangerous place to visitors who were not already consumptive, and especially so to its permanent inhabitants. Certain localities on the Mediterranean coast to which consumptives have resorted for many years have become so infected that the native population have themselves become tuberculous. This was especially noticeable among laundresses who handled the garments of consumptives. This subject was brought up before the Sanitary Convention at Los Angeles and so thoroughly discussed that it has already commenced to bear fruit. It was pointed out at that time that the southern portion of California which, for the past ten years, has so freely welcomed consumptives to come and make this country their home, showed signs of the coming danger. We see by a late Los Angeles paper that the community has become aroused to the danger of indiscriminate mingling of consumptives with healthy persons. Carefully collected statistics show that the native population of Southern California is becoming infected through contact with consumptives from the East. It has been the custom for families to take one or more invalids, irrespective of their disease, into the family for from three to six months. The result should have been foreseen, tuberculosis has gradually invaded the whole of Southern California.

It must be borne in mind that the surest method for the spread of this disease arises from indiscriminate expectoration. On drying there are set free numerous bacteria which are blown about by the wind and become mixed with the dust and breathed into the lungs. Indiscriminate spitting is the curse of the land. No spot is too sacred for the habitual spitter. In churches, halls, waiting rooms, at depots and public conveyances, everywhere in fact, you hear the hawking and spitting followed by the scrape of the foot as the spitter hastens disintegration of the sputum by rubbing the mass in the dust.

The Board of Health of Los Angeles a year or two ago passed an ordinance against expectorating on the streets and in public places, but there never has been any real attempt to enforce it. Every physician knows, or ought to know, that consumption is a contagious disease. He is in a position to better enlighten the people on this question than any other class, and he should never feel that he is out of place when proclaiming the doctrine of contagiousness of consumption and the care necessary to prevent its spread. Physicians must never permit a well person, especially a child, either to sleep or spend many hours continuously in the same room with a consumptive. There is already a growing conviction among the laity that there is something in this besides talk and health boards at no very distant day will have the support of all right thinking persons in aiding the enforcement of strict sanitary laws.

In several cities ordinances against spitting in street cars have been vigorously enforced.

The San Francisco Health Board has authorized its attorneys to immediately prepare and have passed an ordinance for the prevention of expectoration on the sidewalks or in any conveyance.—*Pacific Medical Journal.*

OBSERVATIONS ON THE CLEANING OF RAILROAD PASSENGER CARS.*

By Dr. Domingo Orvanaños.

Member of the Superior Board of Health of the Republic of Mexico.

In order to discuss this question, I have interviewed at length several physicians who have traveled extensively, as well as railroad employés, and I have borne in mind what has been presented at the meetings of the American Public Health Association, and have also given the subject considerable personal attention.

Eight or ten years ago, when surgeons began to discuss the best methods to obtain asepsia of their instruments, there were many opinions as to the media that ought to be used and the methods that ought to be employed. Nevertheless, it was easy to see, that whatever disinfectants were employed and whatever the *modus facendi*, the results did not always turn out as expected, and that in spite of all precautions, wounds were sometimes infected. It became necessary to make radical changes in the construction of the instruments and even of the cases in which they were kept, and it was then found that instruments could be made aseptic with the simplest means, in a very short time and with the greatest facility. As they are at present constructed, passenger cars on the railroads can not be cleansed or disinfected, with either ease or perfect security; in fact the carpets, the woolen cushions, the hangings, curtains, and other ornaments will hardly allow of a complete cleansing, either during transit or even at the terminal stations of the lines. Among railroads which have a large traffic we find many stations in which a great number of passengers get in and out of the cars; many of them are clearly diseased, and these leave in the cars the germs that later on can propagate the disease from which they suffer. Of what use is it to clean out the cars every three or four days, with whatever care it may be done, when with the present construction of the cars it certainly cannot be perfectly done, and if during the time between one cleansing and another, these cars have become infected with the germs of disease? To afford any security against contagion, it is necessary that these cleansing operations should be carried out several times a day, and even then it ought to be of an easy, quick and, above all, efficacious character. To attain these objects, the passenger cars ought to be constructed in a very different manner from their present style. It would be necessary, in the first place, that the floors, walls, and roofs should be impermeable; secondly, that all the entering angles should be rounded off, and all projecting carvings and other structures should be suppressed; thirdly, that all kinds of hangings and carpets should be taken off; fourthly, that the seats and their backs should be easily taken off so as to be replaced by others; fifthly, that the closets should be provided with hydraulic obturators and an abundance of water, containing sulphate of copper in a solution of fifty per thousand.

It would also be desirable that the whole of the bed-clothing, including the blankets and curtains, should be changed daily, as well as the mattresses, at least at the terminals.

It might be thought at first sight, that if the passengers would carry with them the most indispensable articles for their beds, such as a sheet and a pillow or other similar cover, they would be less exposed to the contagion of any disease; but we ought to reflect, that it is not every individual who is cleanly in his habits, and that when treating sick people those objects might be infected to a still greater degree than would be the case with the articles that they might make use of during their stay in the cars; that is to say, that the danger of each passenger contracting a disease through the clothes with which he comes into contact would diminish; but on the other hand, the danger in my opinion would increase in an appreciable proportion, with respect to the germs that might reach him from the clothes of

---

*Read at the Buffalo meeting of the Am. Pub. Health Assn., Sept. 15-18, 1896.—*Journal Am. Pub. Health Assn.*

other persons. In the National prison, in the City of Mexico, epidemics of contagious diseases have always commenced in the department dedicated to short sentences, that is to say, to those individuals who are only to be there a few days, and who generally bring from their own houses the clothes and utensils which are most indispensable for a short detention. I believe that with respect to the bed clothes of individuals who are crowded into such a small space as a coach, we ought to be perfectly certain that they are all clean, and that their use cannot result in danger of any kind to the community in general.

When the cars are constructed in the manner above indicated, their cleansing can be carried out as follows: In the first place, several times a day and in the places that may be considered most convenient, all the parts of the coach where accumulations of dust, sputa, etc., have been noted, should be wiped with a sponge or cloth which should be well soaked in a solution of bichloride of mercury at 1 per 1,000; in the second place, the seats and backs of the sofas should be changed every twelve hours; and in the third place, the whole inside of the car should be thoroughly washed at every terminal station and then be carefully dried.

I think that I may be under the obligation of indicating in this paper the best methods for cleansing the coaches that are at present used on railroads; but it appears to me, that under the circumstances, there are no simple and quick means of carrying out this operation in such a way as to guarantee the results. Since this question of railroad hygiene has been brought before this Association, I think I have noticed that the public takes an increasing interest and gives more attention to the subject; the railroad companies themselves, at least as regards those in my own country, appear disposed to undertake some reforms. It is a part of our duty to continue indicating all the dangers and difficulties which we observe in railroad cars, and when the majority of the public sees with horror, as it certainly will shortly do, those foci of infection that are dangerous in proportion to the elegance of the interiors, the builders will decide at last to undertake the first experiments that are necessary to accord with sanitary science, and there can be no doubt, that the results will correspond to their efforts and sacrifices.

PREVENTION OF CHOLERA IN EGYPT.

The latest dispatches announce that cholera has now been carried to the Ambigole Wells and Akasheh, and has carried off many victims among the advance troops at the front. The army regulations for the prevention of cholera are undergoing revision to bring them up to the date of our present knowledge, since their inadequacy was publicly dwelt upon by Mr. Ernest Hart in India. They lay far too little stress upon the water and food supplies as main sources of infection and epidemic diffusion. There is, however, reason to hope that the practice of the medical officers of the expedition will be in advance of the regulations. The recent experience in India and the results achieved by Professor Hankin in the disinfection of wells will, it may be hoped, be utilized in India, and that primary importance will be attached to the safe-guarding of the potable water. The Ashanti expedition was provided somewhat hurriedly with the Pasteur filters. We fear that the Egyptian troops are deficient in any other means than that of boiling or the use of permanganate; but, whatever means may be employed, it must be remembered that change of station and encampment without precautions of the above character have been shown in India to be inadequate to check the diffusion of cholera.—*Amer. Prac.* from *British Medical Journal.*

THE FLESH OF THE DOG AS FOOD.

There is actually nothing in the flesh of the dog that is distasteful or repulsive. Lewis and Clark, the explorers, who learned to eat it through compulsion, actually became fond of it in time. It is not generally known that it is still a favorite article of diet among certain people, but a French paper says that the number of dogs slaughtered at the abattoirs in Munich has increased amazingly in the past few months. The taste for dog's flesh is said to have been imported by Italian laborers, who have recently come in large numbers to the Bavarian capital. The meat is not only used as an adulterant for sausages, but is eaten openly, under its own name, prepared in various ways.—*Exchange.*

Dr. von Wassmuht, of Frankfort-on the-Main, publishes an article in No. 2, vol. 46, of the *Jahrbuch fur Kinderheilk*, on the digestion of cow's milk by children. The indigestibility of this food depends not only on bacterial and chemical causes, but on physiological conditions, On account of the considerable quantity of casein and salts in cows' milk, hydrochloric acid is combined in much greater amount than when the diet consists of mothers' milk; hence the stomach-contents are richer in bacteria, and, therefore, more irritating to the intestine. In spite of the nutrition contained in the coarse flakes of casein, gastro-enteritis sets in, the symptoms being largely ascribable to the removal of the normal antiseptic, hydrochloric acid. Since hydrochloric acid is ultimately derived from sodium chlorid of the blood, there is theoretical support of the custom of adding salt to the milk, but there is no practical demonstration of the benefit of this custom. —*Med. and Surg. Reporter.*

THE ABUSE OF DRUGS.*

By John Thompson Graham, M. D.

Wytheville, Va.

It may be truthfully said that the American people are a drug-taking people, and the habit—for such it may be called—does not seem to be on the decline. The last decade has been prolific in the great number of new remedies, in addition to the surplus we already had, put on the market, advertised in medical journals, and left in the physicians office for trial. The majority of these new remedies are synthetic compounds, and come from the chemist's laboratory, while nature's inexhaustible store has, for a time, been neglected. *Show us some new drug* seems to be the great cry of the profession.

The history of our profession shows that the children of nature were acquainted with the use of some of our best known drugs long before they were known to the chemist. While not meaning to undervalue the recent discoveries in medicine,and the numerous addition to our materia medica, it must be acknowledged that the majority of our most useful remedies were known to the ancients, and many have been discovered by accident.

To quote from Dr. William R. Gowers, who made ad address on the use of drugs, before a London Medical Society: "We smile at the popular herbal remedies. But it is to these we owe the majority of our most useful drugs. I cannot conceive a therapeutist surveying a list of the chief drugs on which we depend in our daily work—and do not depend in vain—without a sense of wonder and perhaps humiliation. We disinfect our rooms with burning sulphur; and so men did before the time of Homer. We purge sometimes with rhubarb, especially when some subsequent astringent influence is desirable, and so did the old Arabians for the same special reason. The value of castor oil in its chief use was familiar, probably for ages, to the natives of the East and of the West Indies before it was made known in Europe by a physician from Antigua one hundred and fifty years ago. Aloes was employed in the same way long before the time of Dioscorides and Pliny. The knowledge of the influence of ergot in parturition we owe to the peasants of Germany, and the use of male fern for the tapeworm goes back to the old Greeks and Romans. The employment of mercury in syphilis by inunction and fumigation, which our nineteenth century therapeutists regard with much satisfaction, seems to go back to the time of the Crusades, and it is said that its use can be traced in Malabar as far back as the ninth century. Podophyllum, as a purgative, we owe to the North American Indians. If we go through the list of drugs on which we most rely, we find a similar story. Even in the case of those which are the latest additions to our resources, we find that, with very few exceptions, their use arose from what we must regard as pure empiricism. It was by accident that the local anæsthetic influence of cocoaine was discovered." And he might have added to this list quinine, which was also discovered by accident, and the use of the sulphate of copper in the treatment of granulated eyelids, which was known to the Egyptians 1,500 years before Christ.

---

* Presented to Medical Society of Virginia during its Twentv-seventh Annual Session, at Rockbridge Alum Springs, Va., Sept. 10th 1896.—*Va. Med. Semi-Monthly.*

If we will take the trouble to look over the prescription files in our drug stores, and compare the prescriptions we wrote five years ago, with those we write now for the same diseases for which we then prescribed, we will, with no little surprise, recognize two facts:

1st. That we have followed the advice of manufacturing chemists in prescribing their special preparations periodically as they have been brought to our notice.

2nd. That we have abandoned many drugs that we once regarded as specifics, and are at a loss now to know why we prescribed them then.

Why this change? The diseases we have to treat now have the same symptoms, their pathology is the same, and they run the same course they did then; therefore, the change must be in the remedies used, and not in the diseases treated. Evidently there is some cause for this fact, which it is the object of this paper to discuss.

Pathology is defined as that branch of medical science which treats of the modification of functions and changes in the structure caused by disease; or, in other words, pathology is morbid physiology.

Therapeutics is defined as that branch of medical science which considers the application of remedies as the means of cure. In the treatment of any case, the first thing to determine is the pathology of that case, or to what extent there is a deviation from the normal state, which we call health; then the result to be produced is to restore to its normal state the diseased function or part. "Be sure you are right, and then go ahead," was a good motto for Davy Crockett; and it would be a good one for every physician to follow in his practice.

Now, before giving a drug, the physician, after being sure of his diagnosis, should have a clear conception of the effects the drug he is going to prescribe will have on the functions of the body—that is, he must know its physiological action; and then, beginning with a small dose, give the selected drug until its known physiological effect is produced—bearing in mind that the dose given in our books on materia medica is the one to be started with. So, then, when the diagnosis is made and the drug selected, give it full time to produce its effect before changing to some other remedy.

Dr. Wilkes, President of the Royal College of Physicians, maintains that in the administration of drugs, we should be guided by experience only, or, as he expresses it: "What I do object to is the attempt to treat cases of disease on principle when we possess no principles; we do not know sufficiently the action of drugs to do this, and we know less of the meaning or significance of symptoms which we treat. In these circumstances, I maintain it is wiser to follow the empirical method and act on experience only.

"It seems to me so obvious that, with an imperfect pathological knowledge and a considerable ignorance of the action of the drugs, therapeutics cannot, in its largest measure, possibly be scientific. The cases where the rationale can be given for the use of any medicine can be numbered on the fingers.

"I am anticipating the day when there will be a system of true scientific therapeutics; but until that arrives, I think we should rather be guided by our experience in the use of drugs than by any principles of our own concoction.

"One of the worst practitioners I have ever known was a man who had a reason for the employment of every medicine he prescribed. One example will suffice—viz: maltreatment of a case of whooping-cough by giving nothing but nux vomica as he understood it was a nervous complaint. At present, every man is a free lance, and treats his case according to his fancy. Should it be a case attended by fever, one medical man gives antipyrin to reduce the fever, and another digitalis to reduce the pulse, and so on."

Dr. Wilkes seems to overlook the fact that a drug misused ought not to bear the blame that should be attached to a physician's faulty reasoning. Where the reason is at fault, the practice resulting from that reasoning ought not to be called rational medicine; yet he is right in saying that it was wiser to follow the empirical method and act on experience only, if he had added that empiricism is rational; or, in other words, what better reason can a physician have for giving a drug than the reason based upon the fact that the drug has relieved or cured similar cases under similar conditions?

An abuse of drugs that is common to many physicians is giving too many at the same time. It is certainly bad practice to give sedatives, purgatives, narcotics, and stimulants, all at the same time, or within a few hours of each other. In every disease there are one or more prominent symptoms to be treated that have a great many minor symptoms depending upon them, which will disappear as soon as the cause of the more prominent symptoms is removed. One cardinal rule must be remembered in prescribing drugs—keep the bowels and kidneys—the great sewer system of the body, open and active. It is well to remember for our comfort many times, that the human body has a certain amount of what is called reserved force, and that the tendency of the diseased body is to get well; therefore, we should always be on our guard to do nothing to hinder or retard that tendency. At the same time, it is well not to forget that man is mortal and sooner or later must die, and women and children are no exception to the rule.

A very common abuse of drugs, especially in the last ten years, is the use of faulty and useless combinations. If we take the time to look over the preparations of the large drug houses, we are surprised at the great number of combinations whose physiological effects are opposed to each other, or in no way assist the action of the main part of the prescription; for example, belladonna, a drug whose action begins within a few minutes after its administration and dries up the secretions and paralyzes the involuntary muscles, has gotten into numerous laxative and purgative pills whose action is not completed for twelve or eighteen hours after their administration. It is said that belladonna prevents the griping of the purgative with which it is combined. This is an assertion, contrary to the known physiological effect of the drug as compared with the time it takes for the two remedies to produce their effects, that cannot be proven. Another faulty combination is the use of pepsin with bicarbonate of soda. Pepsin can act only in an acid medium, and whenever an alkali is added to it the acid in the stomach is somewhat neutralized, and the action of the pepsin is either weakened or totally destroyed.

It is a well-acknowledged fact that nervous diseases are on the increase. We have in our drug stores a multiplicity of remedies called nerve tonics which were not known to the profession over a generation ago. The cause is the abuse of food as well as in the abuse of drugs. Nature has abundantly supplied in our food products all the elements that are needed for the human body; but in the last few years the phosphates, the most important elements of food for the nervous system, and also for the bone structure, have been taken out of the wheat in the new process of milling. The demand for white flour has resulted in the miller giving us starch, while the phosphates and gluten are fed to horses and hogs. We have sacrificed nutrition for whiteness with the baneful results that the growing generation have a badly developed skeleton, poor nourished brain and nervous system, and decaying teeth. There is an attempt to supply the demand for nervous foods in the multiplicity of drugs, until we have an endless list of phosphates, hypophosphites and phosphorous preparations *ad infinitum*, and oftentimes *ad nauseam*, to supply what nature has given us, but man, in his great wisdom, has deprived us of.

We will now consider some of the new drugs that have lately been prescribed for almost every disease that the flesh is heir to:

First. The cold tar products of whatever name, whether of German or American manufacture. No doubt they have some effects in relieving congestive headaches and rheumatic pains, but their curative effect is doubtful. They were for a long time depended upon to reduce and control high temperatures in every disease attended with fever. While they will reduce the temperature of the body, it is done mainly by the increase of the heat waste and not by decreasing the heat production, and in that way lowering the vitality of the patient, sometimes to an alarming extent. For the last year or two, they are being more prescribed for headaches and less prescribed in fevers, unless in combination with other old and well-tried remedies, such as quinine, caffeine, and ammonia.

Every physician has had an abundance of literature and many talks from agents of manufacturing chemists on their perfect substitutes for iodoform. They have all been used and found wanting, and iodoform, despite its unpleasant odor, yet holds its place as the best dry antiseptic for surgical cases.

What physician has not been disgusted with the numerous and worthless digestive ferments that have been put upon the market in every form imaginable, while none of them come up to the standard they claim, and are more and more being abandoned by the profession as useless and expensive remedies?

What does all this change prove? It proves that medicine is an inexact science, and that the physician who relies too much on drugs for the cure of his patient will often be sadly disappointed in the result. This grasping after something new is all right, if not carried too far. In short, old friends, though not perfect, should not be discarded until new ones have proven themselves more reliable.

DANGERS OF THE LEAN MEAT DIET.

PRACTICAL experience, as well as theoretical considerations, lead to the conclusion that a lean meat diet, continued for any great length of time, is incompatible with the highest health. For example, the leading medical teachers in France have for several years been sounding the note of warning against the use of an exclusive meat diet in diabetes, a disease for which lean meat was formerly supposed to be not only highly essential, but almost a panacea. A close study of the history of these cases has shown, however, that an exclusive meat diet is not infrequently a cause of death, through the accumulation of so great a quantity of ptomains within the body that the overworked kidneys are unable to cope with them.

Physiological facts which are known today fully justify the statement that a person subsisting upon a lean meat diet, however comfortable he may be, however much relieved from various digestive inconveniences to which he may have been previously subject, is nevertheless in a pathological state, and one which is vastly more serious than the conditions which ordinarily arise from the simple fermentation or souring of saccharine or farinaceous foods in the stomach. The acids developed by such fermentations are irritating, and produce more or less disturbance, local and reflex; nevertheless, the ultimate effects are by no means so formidable as those of the insidious but far-reaching and tissue-changing poisons which accumulate in the body as the result of a lean meat diet.

The truth seems to be that a person subsisting upon a lean meat diet, while he may manifest a greater amount of strength than upon a more natural dietary, and may be unconscious of any abnormal condition, is like a person in a powder magazine—he is in constant danger of vital catastrophe. The poison-destroying functions of his liver and the poison-eliminating capacity of his kidneys are taxed to their utmost to keep the proportion of ptomain and leucomains in the tissues down to a point which permits of the performance of the vital functions. The margin of safety, which nature has wisely made very large in order to provide for emergencies, is reduced to the narrowest possible limit, so that anything which temporarily interferes with the functions of the liver or the kidneys, or which imposes additional work upon them, may be sufficient to obliterate the safety margin, and produce an attack of grave or fatal disease. Invasion of the body by ptomain-producing microbes, such as the typhoid bacillus, the bacillus of diphtheria, the pneumococcus of Friedlander, the shocks resulting from accident, and even the depression of a severe cold, may be sufficient to consume the meagre emergency capital, and the result is acute inflammation of the kidneys, or death under chloroform or from shock following an operation under anesthesia.

It is evidently the duty of the physician who places his patient upon a lean meat diet, to inform him of the fact that under such a dietary he is living close to the border-line, that his situation is like that of a man walking along the brink of a precipice, that he must on no account submit himself to the influence of an anesthetic without first undergoing a few days preparation, including an entire change of diet; and the truly wise physician will further instruct his patient that however a lean meat diet may be considered as a temporary expedient, it cannot be safely adopted as a continuous dietary without the risk of constitutional degradation and injury.—*Medical Progress.*

THE CAUSE OF INTEMPERANCE.

THERE is no topic of social reform that requires more dexterous and well-informed handling than that of intemperance. The Protean aspects of this vast evil are daily before medical men, probably in a far greater degree than they are disclosed to other professions or to the general public. Medically speaking, of all the list of causes given in the systematic text-books, under the heading of Etiology, none appear with greater and more monotonous frequency than that of alcoholism. Indeed, the influence of strong drink, both in the causation and the modification of disease, is nothing short of disastrous, and fully accounts for the lifelong crusade against its use which is undertaken by many prominent medical and other reformers.

An interesting contribution to this evergreen topic was recently printed in our columns in the shape of an article by Sir Willoughby Wade, the well-known Birmingham physician. His address was delivered at the request of the Church Congress under the selected title, "The Causes of Intemperance and Possible Remedies," and it is highly suggestive of the present aspects of the whole temperance question that four-fifths of the matter dealth with "causes," and the remaining fraction with "remedies."

The lecturer discussed the various aspects of the use and abuse of alcohol as they usually present themselves to the medical practitioner. With reference to the much-vexed voint as to the value of alcohol as a drug, without hesitation he delivered an affirmative opinion. "I would repeat," he remarked, "for the instruction of lay persons, some of whom have an overweening belief in alcohol as a remedy in acute diseases, that it is not because a patient has got pneumonia or typhoid fever, or any other acute disease, that he requires alcohol, but that he does require it when certain symptoms show themselves." We fancy that the principle of this dictum piths the philosophy of modern medicine, not only as regards the use of alcohol, but that also of numerous other therapeutic remedies. Were it possible to treat each disease as a specific entity, apart from considerations of the individual and his environment, and from pathological variations and complications, there would no longer be any need for the attendance of the skilled physician, but the whole healing art might be handed forthwith to the dogmatic mercies of bone-setters, patent medicine vendors, and other unqualified empirics.

To the popular mind, there is no more general panacea for all bodily woes than alcohol in one or other of the multitudinous forms into which it has been fashioned by the ingenuity of man. In view of this universal fallacy, the formally stated opinion of an experienced physician to the contrary is always of value. Accordingly, although the point is by no means new, we are glad to find Sir Willoughby emphasising the fact that in perfectly healthy persons alcohol is not a necessity. Another point insisted upon in late years is the physiological factor of environment in the causation of intemperance, but, strange to say, this appears to have escaped his attention. There can be little doubt that insanitary dwellings and workshops, unhealthy trades, and excessive hours of labor, are indirect causes of alcoholism, for the jaded body flies to drink for temporary comfort and support as naturally as a duck turns to water. As to dealing with what are tersely described as "habitual drunkards," the lecturer had little to say, and confined himself chiefly to describing the present method of voluntary seclusion. He appeared to think that the case for compulsory detention was surrounded by so many difficulties that it is not likely to come upon the stage of practical politics, at any rate while public opinion maintains its present attitude with regard to the liberty of the subject. However that may be, as far as concerns the majority of chronic inebriates, there can nevertheless be no question whatever, that some drastic action is needed for the rational control of the police court drunkard who is convicted it may be, many hundreds of times. To attempt to reclaim such an unhappy and life-long victim of alcohol may be hopeless, but on the other hand to punish remorselessly again and again is worse than folly. To our mind, the existence of the much imprisoned habitual drunkard of the police courts of this country is a blot on the moral and psychological intelligence no less than the common humanity of a great and enlightened community.—*The Medical Press.*

MILK INSPECTION.

We note with pleasure that the Board of Health of San Mateo County has inaugurated a movement for the inspection of food products, especially dairy products. This will prove of great benefit to San Francisco for an enormous quantity of milk and other food stuffs are daily brought into the city from San Mateo County. This movement is in line with the remarks we made a month or two since that we could not have proper protection until every county in the State had a law ordering thorough and systematic inspection of its dairies. The so-called excellent sanitary condition of many dairies which inspectors so freely commend are so only by comparison with their generally filthy condition of past years. We still hold to the proposition that the examination of cows for tuberculosis and the application of the tuberculine test, though an important matter, is not the right way to begin the reform for pure milk. We believe that a rigid inspection of the cow's surroundings; the character and quality of food given; the arrangements for their shelter in stormy weather; the cleanliness of the premises; the cleanliness of the cows themselves; the care taken when milking to keep every atom of filth from the milk, pail, etc., are of such vital importance that all else is really overshadowed. Killing diseased cows does not guarantee that our milk will be pure, for the presence of tubercle bacilli is not the worst thing that may enter into milk. Suppose your milk is pronounced free from this element of danger, it may contain, through adulteration with filthy water, far greater dangers, such as typhoid fever. How many milkers, think you, clean their hands, and carefully wash the cow's udder and teats before milking? Not many, we venture to assert. Yet through this very negligence comes the most prolific source of danger. The milk which issues from the teat sterilized may in a few minutes become infected from extraneous causes. Go and look at the premises where the cow is kept and carefully note the condition they are in, see if in the majority of cases there is not that absence of scrupulous cleanliness which should be present where such a necessary article of food is handled. Look at the cows, note if their hair is clean and smooth, or dirty and rough. If a filthy environment is injurious to man it must be equally so for animals. To have healthy cows, they must have healthy surroundings, pure air and plenty of it; clean wholesome food, regularly supplied; pure water to drink, and a clean place to lie down. Protection from inclement weather, and grooming of the animal are great aids for warding off tuberculosis and all other diseases. The next point is strict cleanliness in handling the milk from the moment it leaves the cow to the time it is delivered to the consumers. As soon after milking as is possible remove it from danger of absorbing micro-organisms. Air-borne spores are very numerous, especially about the cow-yard, and milk is exceptionally quick to become contaminated while warm. Carrying out these precautions will in time give us healthy cows and pure milk. For the present it is safer to sterilize all cow's milk before giving it to infants and young children. The financial loss to dairymen already due to want of confidence on the part of the public would have easily paid the cost of making every dairy in this State a clean and healthful spot.—*Pacific Medical Journal.*

THE FLY AS A GERM CARRIER.

In 1866, Hoffman demonstrated the presence of tubercle bacilli in the bodies of flies captured in a room occuped by a consumptive. The droppings of the flies were full of bacilli, which were shown by experiment to be fully virulent·

Six years later, Mr. A. Coppen Jones, of Switzerland, proved by means of chromogenic (pigment-forming) bacteria that infection can be, and actually is, carried, not only in the bodies of the flies, but also by their feet. In one experiment cultures of the bacilli prodigiosus were mixed with tuberculous sputum. Flies which had been in contact with this mixture were permitted to walk across the surface of sterilized potatoes. In forty-eight hours numerous colonies of the bacillus prodigiosus were visible.

From these results we may reasonably conclude that flies are a constant source of infection.

A CASE OF TUBERCULOSIS BY INGESTION IN A LITTLE GIRL OF SIXTEEN MONTHS.*

The parents of the patient were healthy; among ten children, one girl of three years had died of tuberculous peritonitis; another was affected with coxalgia. The patient, when nine months old, had been treated for tuberculous adenitis. When she came to the Children's Hospital she was in a cachectic state; large ganglia of the neck, profound ulceration of the superior gums extended to the palatine arch; nothing abnormal found in the examination of the thorax. There was a microadenia in the inguinal regions. The belly was distended and furrowed by large veins; there was diarrhœa, but no fever. The child died a few days after entry into the hospital. At the autopsy very large tuberculous mesenteric ganglia were discovered. Several large ganglia were also seen, adherent in the ileo-cecal angle; the ileo-cecal valve was completely surrounded by a tuberculous ring of ulceration; there was a slight ulceration in the cavity of the appendix. The whole length of the ileum was covered with large irregular ulcerations ; these latter lesions were less numerous upon the jejunum and the duodenum. Nothing abnormal in the liver, the spleen or the kidneys ; there was some transparent granulations upon the lungs.

---

* Translated for St. Louis Clinique by Rutherford Gradwohl.

LÖFFLER'S BACILLUS AND DIPHTHERIA.

Hennig, of Königsberg (*Charlotte*, N. C., *Medical Journal*, August, 1896), gives the results of an exact clinical and bacteriological examination of sixty-three cases in relation to Löffler's bacillus as follows: Löffler's bacillus was found in thirty-five cases ; in only some of these was the disease clinically true diphtheria ; in others it was follicular sore throat or tonsilitis, and one was a case of pharyngitis apthora. In seven cases which later exhibited paralysis the bacillus was not found.

Hening concludes from this that this microbe cannot be invariably the determining agent in Bretoneau's diphtheria, and that no treatment based on the hypothesis that it is so can be accepted as specific. He further states that the results from serumtherapy are by no means as brilliant as they seem ; that many writers had obtained better results before antitoxin came into use, having cured all but three or four per cent. of their cases, including gangrenous and scarlatina cases. Hennig recommends the use of limewater, and the permanent application of an ice cravat, etc.

GRAPE SEEDS AND APPENDICITIS.

There has arisen in many localities such an absurd idea that the seeds of grapes will produce appendicitis that the sale of grapes has been greatly restricted. *(Pacific Medical Journal.)* As an article of food no fruit is equal to grapes and they can be eaten with absolute freedom by all persons. When converted into raisins they have a food value second to none among the dried fruits. The percentage of sugar is so great that as an article of diet they should find a place on every table. One is not obliged to swallow the seeds unless he so desires. Stewed with prunes or figs, raisins impart a delicate flavor which is greatly admired by those who have tried it. There are many ways to prepare raisins which, if generally known, would greatly increase the demand for them. Containing, as they do, upwards of thirty per cent. of sugar, we have, bulk for bulk, a greater concentration of nutrition in raisins than in any other food. They are so cheap that every family can use them almost as freely as bread.

TUBERCULOSIS OF HUMAN BEINGS AND OF FOWLS IDENTICAL.

The experiments of MM. Gilbert and Roger, recently published, show conclusively that the tuberculosis of human beings and of birds is one and the same disease. Observations made by Cadiot and Strauss also confirm this fact.

Department of Physical Education,

WITH SPECIAL REGARD TO THE SYMMETRICAL DEVELOPMENT OF THE BODY

Edited by J. CLARK SLAY, M.D.

A FRUITFUL CAUSE OF INDIGESTION.

THERE is no more fruitful cause of indigestion than indolence. It is a rare experience to meet a person suffering from dyspepsia who earns his bread by the sweat of his brow. A vast majority of all the cases of indigestion met with is due to a want of one and strength of the organs of digestion from lack of exercise, and not from any special disease of the stomach.

Active exercise of the entire system is imperatively demanded for the continued healthy performance of the digestive function with complete nourishment of the body. While food is essential for the nourishment of the organism, without exercise its purpose quickly fails of accomplishment.

The foods which form the staple diet of civilized people are with few exceptions wholesome and nutritious, but there is a growing tendency to the concentration of food-stuffs which frequently works harm to the consumer. This process of concentration has often the effect of rendering the food too nutritious for its quantity and one is apt to take more nutriment into the stomach than is actually required before the feeling of satisfaction has been reached. Over-eating, therefore, is not always intentional.

The generally accepted opinion that food-stuffs in a concentrated form are more easily digested is erroneous, for when the requisite amount of nutriment is taken in this form, its quantity is not generally sufficient to stimulate the stomach to do its best work. Nearly all sufferers from atonic dyspepsia will agree that the stomach performs its function better when moderately well filled at regular intervals. Many of the uncivilized races have learned this truth. When the Laplander was discovered mixing sawdust or decayed wood with his ration of oil, and was asked why he did this, his reply was, "The belly must be filled." If many of those who suffer from impaired digestion would adopt the plan of eating two or three moderately full meals at regular intervals during the day—allowing the amount of exercise taken indicate whether it shall be two or three—and take nothing into the stomach between meals, except a plentiful supply of pure water, they would soon find their sufferings very much lessened and with sufficient exercise completely relieved.

The worst feature connected with concentrated food-stuffs, however, is their scant supply of waste material. Not only are foods in this form rendered more difficult of digestion, but their lack of waste material is the most frequent cause of constipation, the bane of so many lives. The intestines must have something to act upon in order that they may be stimulated to act at all, and the sparcity of waste material contained in chis class of foods is not sufficient for this purpose For the want of this stimulus the bowels become sluggish, then weaken from inactivity and finally refuses to act when the stimulus present would have been sufficient for this purpose in a normal state.

It should always be borne in mind that the quality of nutriment supplied in the shape of food is scarcely more important than the kind of exercise indulged in. A healthy condition of the digestive organs is best maintained or restored by some light form of general exercise persevered in at regular intervals. All severe gymnastic exercises which include the lifting of enormous weights, the swinging of heavy Indian clubs and dumb-bells and difficult trapeze performance are not necessary for health.

Nearly all practitioners or educators in physical culture have abandoned almost every form of heavy exercise formerly practiced for health and the symmetrical development of the body. Light and moderately rapid exercise is now known to produce much better results and without any risk of injury.

DRESS REFORM FOR WOMEN RENDERED PROBABLE BY THE BICYCLE COSTUME.

A FEMALE medical practitioner who has ridden the wheel since 1888, has expressed herself as sanguine that a healthful and comfortable dress will be the outcome of the extension of the bicycle habit among females. She states that she has modeled one for her own use, which satisfies her as preferable, on a variety of occasions, to the dirt collecting long skirt. "I frequently shop in my bicycle costume," she said, "and, while much staring and often audible comment greet me, yet I think if the costume were universally adopted it would soon cease to be noticeable. As to its merits there can be no doubt, and no woman who has experienced the freedom and comfort of the short, light skirt will willingly return to the long, heavily lined skirt which fashion now prescribes. Women are slaves of fashion, and it will be a difficult matter to bring the most approved style of short skirt in vogue, for it is detrimental to the interest of the mercantile trade. Many furbelows would follow the long skirt if it were discarded and in its stead a modification of the bicycle costume adopted, for the latter only lends itself to the severest adornment. I object to bloomers," she continued, "because they create unfavorable comment and are often immodest. I think it is a great mistake for women to walk around and sweep up the dirt with their skirts, and I am in hearty sympathy with any movement to get rid of them for a more sensible style of dress. I do not wear corsets, and I have used my pen and voice equally to persuade other women to discard them. In some cases I have been successful, but in nine cases out of ten a woman clings to her corset as the drowning man clings to a straw. The long skirt is equally reprehensible, and there is no garment so ungraceful, so suggestive of untidiness as a long, rain or dirt bedraggled skirt. Especially is this the case in stormy weather, when woman requires all her strength and the free use of both hands and limbs to battle with the elements, and is generally so encumbered with umbrella, bag and parcels, that her skirts are allowed to trail unnoticed through wet streets. Any dress which it will not be necessary to hold up and will be comfortable and useful, will be welcomed by all sensible women. The bicycle costume, when the skirts are a graceful length, and not too light about the hips, seems an ideal costume for a rainy day, and adaptable to walking and outing generally. I shall be most happy to advocate its use. A learned gentleman once told me that women would never attain the same power intellectually and physically as men until they freed themselves from hampering clothes. Men will not submit to uncomfortable fashions in clothing, and consequently do not suffer from the nervous disorders that are produced by the unhygienic and irritating clothes that are worn by women."—*The Journal.*

SOMETHING ABOUT CLOTHING: ITS USES AND ABUSES: WITH A POINTER FOR ATHLETES.

BY CHARLES E. PAGE, M. D.
Boston.

ASIDE from theoretical considerations, which seem very clearly to show that clothing of every description is contraindicated in warm weather, particularly when exercise is being taken, it is found in practice that the "sweater" does not accomplish the purpose for which it is employed, viz: for reducing weight. In a recent trial of a three-hours' run on a bicycle the scorcher's reduction was somewhat less and his fatigue much greater on the day on which he wore his sweater than on the succeeding day when he made the run as nearly nude as the laws of Massachusetts allow.

In a discussion before the New York Surgical Society on "The Relation of the Weather to the Fatality Following Surgical Operations," it was shown that a larger percentage of fatalities after operations occurred during humid weather. Dr. Fred. W. Gwyer answered the question "Why is higher humidity so detrimental?" as follows:

"(1) In reducing the amount of excretion of the products of metabolism by the lungs and skin. Expired air is loaded to saturation with moisture containing excrementitious material,—principally carbonic acid but also ammonia and organic solids. If dry air be inhaled the expired air contains 100 per cent. of moisture with its proportion of effete material. If the air inspired contain 90 per cent. of moisture, necessarily but 10 per cent. of the returning moisture is directly from the lungs. If the normal New York air contain 72 per cent., there is left for the lungs, as a means of elimination 28 per cent. (with no allowance for difference of temperature). As this percentage is reduced, so a corresponding part of the lung function is interfered with.

"So also with the skin, which normally throws off excrementitious material which is increased in dry, and naturally lessened in moist, air. Consequently, excessive humidity," [arising, according to the present writer's theory, from surplus clothing, notably the usual flannel inner suit and the sweater, the former soon becoming saturated with foul moisture which is prevented from evaporation by the ordinary dress, topped off with the smothering sweater] "interferes with the action of the skin as an eliminator, and the excrementitious material remains to poison the system or must be secreted and eliminated by other means—notably the kidneys,—thus throwing upon the system and organs, at a time when they can least bear it, a greater amount of metabolic products and a greater amount of work of elimination."

Now, for the purpose of the present discussion it matters little whether it be a question of a surgical operation or extraordinary muscular effort or, indeed, of general health solely, since it is clear that in either case the body should, in so far as is possible to secure it, be placed under the most favorable conditions. Not only should there be for the "scorcher" free play for the lungs, but also for the skin (not inappropriately called the "outer lungs"), when sharp exercise is being taken, since at such a time the amount of carbonic acid formed in the system and loading the circulation is of course greatly increased, and it is only over those parts which are in free and unobstructed communication with the air that the skin can properly perform its function as a breathing organ, the millions of blood-vessels in the skin exhaling carbonic acid and inhaling (if we may be permitted these terms) oxygen more or less restrictedly according as they are more or less "smothered" with clothing.

Everyone understands the mischievious effects of restricted breathing, in the ordinary sense of the term, as by physical compression of the throat, closure of mouth and nostrils even partially, or "plugged nostrils" (from inflammation of the mucous membrane, ignorantly called "cold in the head," more often than otherwise due to excessive clothing which, by interfering with the functions of the skin, throws extra labor upon the lungs and "inner skin," *i. e.*, the mucous membrane), etc., but it is not generally known that restriction of skin-breathing is by the same token mischievous, and that every fiber of clothing worn tends to this end. Man is not by nature a clothed animal, and eminent thinkers among the most practical physicians in this country and Europe are already advocating nakedness as the natural cure for consumption and other chronic diseases.

It is well-known to thoughtful students of history that entire races have been destroyed solely by being compelled to adopt the garb of civilization. The aborigines of Tasmania, a most hardy and prolific race, were enabled to withstand no end of abuses perpetrated by the invaders of their country, rum, tobacco, even massacres, etc., but when the encroachment of civilization reached the point of compelling them to wear clothes they began to decline, chiefly with pulmonary diseases, and the race was finally swept from the face of the earth, not a soul remaining to tell the tale. Hittel, in his History of California, notes the disastrous effects of clothing on the Indian converts of the Spanish padres. They began to die off with pulmonary troubles.

The fact of the matter is this: Even the single ordinary suit required for draping the body in accordance with law and our social practice, tends strongly to hinder the skin in its normal functions, and of course the inner suit of flannel so completely worn, much of the time to the discomfort of its victim, is in warm weather an unmitigated nuisance and unhygienic in the highest degree. Then what shall we say of the sweater when worn on top of all? The skin is kept bathed with perspiration and consequently in a humid atmosphere, thereby, as remarked by Dr. Gwyer, hindering the normal excretory work of the skin. Moreover, the skin is made tender and soft by this sweat-pack, when it should be made robust by impact of fresh, dry and pure air, a condition so desirable from the physiological and hygienic standpoint.

Moral: Let us *use* clothing, not *abuse* it. This rightly interpreted means as little as the law allows, except in so far as demanded for comfort as a protection from actual cold, that is, out of doors in cold weather. Since even in winter we are during the many hours spent indoors living in an atmosphere practically at summer temperature, it is clear to the minds of many thoughtful students of the laws of life and health that there is no proper functions for "winter flannels" which cannot be put on or off according to changing needs from hour to hour as can the outer wraps, and that therefore it is to these last only that we should look for needed protection on going from warm rooms into the open air in cold weather. Experience and observation prove that the less one wears indoors the less extra clothing he requires for comfort out-doors.

Since most persons will persist in wearing the inner suit, I am now urging the use of porous linen, such as Fr. Kneipp recommends; and I have found an article that fully meets all requirements in the so-called linen-mesh goods manufactured in New York City. This is even better than the coarse linen almost universally worn for underwear in Russia, where experience has shown (I. Hapgood in "Russian Rambles") that linen underwear is "warmer" than flannel, since it allows of the evaporation of the moisture exuding from the skin, thereby giving a "dry climate" about the body, *dry cold* being less trying and more easily borne than *moist* cold, as we know. It is also "cooler" in summer than flannel since *dry* heat is far less trying to our comfort than moist heat.

As hot weather approaches every year it is pitiful to think of the mortality among infants and young children, a large percentage of all sicknesses and deaths among the little ones being due to excessive clothing in summer.—*Philadelphia Polyclinic.*

TREATMENT OF DIGESTIVE DISTURBANCES IN CHILDREN.

By Dr. H. Wolf.
Assistant to the Pediatric Clinic of Prof. Monti, Vienna.

Notwithstanding the large number of infant foods and methods of artificial nutrition, it has hitherto not been possible to obtain a substitute for woman's milk. It can be readily understood that in hospitals for diseases of children, the aim has been to test all new foods with a view of determining their true value.

Lately, the addition of Somatose to milk has been recommended as an appropriate substitute. At the request of my chief, Prof. Monti, I have made clinical experiments with this preparation and, in the following, report the results of my observations.

Before discussing my results, I would say a few words regarding the chemical composition of this product.

Somatose is a yellowish, odorless, granular powder, readily soluble in aqueous fluids. It is prepared from meat, and consists of albumoses, 88.57 per cent.; salts, 7.46 per cent.; peptones, 0.24 per cent. Hence, the albumoses, which occupy an intermediate stage between albumin and peptone, comprise the main constituent of this preparation.

What influence does this powder exert upon the composition of milk? It is well known that the casein of cow's milk, as regards its coagulability, behaves differently than the casein of woman's milk. The former curdles in a finely divided state. This circumstance has always been regarded as one of the chief causes of the slight assimilability of cow's milk by infants, and consequently as the cause of the failure of artificial nutrition with diluted cow's milk. For this reason attempts have been made to obviate this by various additions. In view of its high content of albumoses Somatose seems adapted to fulfill this aim in every respect.

If to cow's milk in a certain proportion we add a certain quantity of an aqueous solution of Somatose, we are able to affect cow's milk casein in such a manner that with commencing curdling of the milk the casein is precipitated in fine flakes. Whether through this alteration of cow's milk casein the milk is more readily digested by infants I cannot maintain on the ground of chemical experiments, but this seems probable in view of the clinical observations reported farther on. Reports have been made in this direction by several authors. Drews has employed Somatose as a nutriment in twelve cases of cholera infantum, and considers himself justified in the conclusion that cow's milk with addition of Somatose is better tolerated by infants than diluted cow's milk, and attributes his favorable results to the use of this preparation.

Other observers relate several cases of gastro-intestinal catarrh in infants which were rapidly improved after administration of Somatose.

Before reporting my results I would briefly mention the method of employment which has appeared to me the most practicable.

In exhibited Somatose in two forms: In the hospital and in the case of very young infants the mixture recommended by Dr. Goldman*(*Pharm.Ztg.*No.86,1893)was tried. For the patients in the Polyclinic the preparation was ordered in gramme doses, with the strict injunction to dissolve the powder in warm water before its addition to the milk, which was diluted according to the age. Attention was also called to the point that the Somatose milk should contain no flakes of undissolved Somatose.

Children under one year received 4.0 gm. older children 8.0 gm. daily. The food was given to younger infants at intervals of two and one-half hours.

---

*To one litre of cow's milk is added 730 C. cm. water, 46.0 Gm. sugar of milk, 36.5 Gm. fat (i.e., 71.0 Gm. cream having an average of 50 per cent. fat), 10.7 gm. Somatose.

The analysis of milk thus prepared was made in the chemical laboratory of Prof, Mautner at the General Polyclinic by Dr. Katz and showed:

Dry Substance	11.6 Gm. in 100 c. cm.		
Water	88.4	"	
Sp .G. 1030 Ash.	0.5	"	
Total Nitrogen	0.39	"	corresp. to albumin and casein 25%.
Fat	3.5%		
Sugar	5.1%		

The milk employed in these experiments was not sterilized, as my chief aim was to render this method of nutrition available for the poorer classes who will not devote the time for a complicated procedure.

I have employed Somatose in fifty cases but have tabulated only thirty-five, because these received this preparation exclusively. Those patients who, besides Somatose as a nutrient, were submitted to medicinal treatment are not recorded, in order to obtain data completely free from objection.

Table 1, contains the histories of two infants, suffering from dyspepsia on which experiments in nutrition were made.

Case. 1.—Hermine Fuchs, aged 10 weeks was admitted Feb. 22, 1896, with a bodily weight of 3,700 gms. Previous nourishment had consisted of milk and Russian tea. Child is very pale, emaciated; eczema around arms, meteorism; restlessness; dyspepsia.

Date	Bodily Weight	Amount of Food	Vomiting	No. of Stools	Character of Stools	Weight of Feces	Utilization of Food per ct.
Feb. 23	3,700 gm.	400 gm.	3 times	2	Yellow, firm, ill-smelling	30 gm.	7.5
Feb. 24	3,750 gm.	500 gm.	Once	3	Soft, yellow	20 gm.	4
Feb. 25	3,820 gm.	800 gm.	3 times	5	Soft, yellow	35 gm.	4.3
Feb. 26	3,900 gm.	800 gm.	Once	3	Soft, yellow	30 gm.	3.7
Feb. 27	3,960 gm.	800 gm.	Once	3	Soft, yellow	24 gm.	3
Feb. 28	4,000 gm.	900 gm.	Once	3	Soft, yellow	23 gm.	2.6

REMARKS

Feb. 23.—According to age the child should have had a normal weight of 5,000 gm.; it came under treatment, therefore, with a minus of 1,300 gm.

Feb. 24—Slight improvement in general health corresponding to the improved digestion.

Feb. 25.—Patient much more quiet; eczema and meteorism disappearing.

Feb. 26.—Improvement persisting.

Feb. 27.—Improvement persisting.

Feb. 28.—Patient increased in weight 180 gm. more in one week than would be apt to occur normally. Dyspepsia has disappeared.

As appears from the above table, the bodily weight, quantity of food ingested, weight and character of stools were recorded. As early as the third day we note a better utilization of the ingested food, as, notwithstanding that the quantity of nutriment remained the same or even was somewhat larger, the evacuations weighed less than on the previous days.

Case. 2.—Ludovika Shandl, aged 3 months, was admitted Feb. 22, 1896, with a bodily weight of 4,400 gms. Previous nourishment had consisted of diluted cow's milk. Child extremely emaciated, pale; dark circles around eyes; anterior fontanelle depressed; eczema over entire body; meteorism, great restlessness; dyspeptic stools; frequent vomiting.

Date	Bodily Weight	Amount of Food	Vomiting	No. of Stools	Character of Stools	Weight of Feces	Utilization of Food per ct.
Feb. 23	4,350 gm.	500 gm.	5 times	7	White, firm	56 gm.	11.2
Feb. 24	4,370 gm.	700 gm.	6 times	6	Yellowish white flocculi	33 gm.	4.7
Feb. 25	4,420 gm.	800 gm.	5 times	6	As on previous day	35 gm.	4.4
Feb. 26	4,450 gm.	900 gm.	2 times	4	Partly yellowish, partly white, soft	40 gm.	4.4
Feb. 27	4,500 gm.	900 gm.	Once	3	Same as on previous day	30 gm.	3.3
Feb. 28	4,550 gm.	1000 gm.	Once	3	Same as on previous day	32 gm.	3.2

REMARKS

Feb. 23.—Patient came under observation with a minus in bodily weight of 1,950 gm.

Feb. 24.—No change in general state.

Feb. 25.—Child less restless; otherwise no essential change.

Feb. 26.—Meteorism has disappeared.

Feb. 27.—Slight improvement in general condition.

Feb. 28.—Increase in bodily weight during short period of observation was equal to that of a healthy child of same age.

The time of observation of these two cases (unfortunately they were removed from the hospital by the parents at too early a period) was too short to permit of a positive decision with regard to the value of these extremely favorable results. As, however, the results obtained completely coincided in both instances, I think myself justified in grouping them with the other cases, the more so as subsequent observations in the out-door service showed a progressive improvement in the general condition of the patients.

Class 2 comprises fifteen cases of atrophy from chronic dyspepsia.

Case 3.—Adolph Maschek, aged four months, weight 3,250 gm. (5,950 gm.),* fed on artificial foods, admitted Oct. 14, 1895. Extremely emaciated, face like that of an aged person; skin dry and wrinkled; fontanelle sunken; diffuse eczema; meteorism; four to five stools daily, thin, yellowish, partly containing greenish-white flocculi; vomiting. Nov. 14, weight 4,300 gm., face somewhat fuller, skin elastic, stools firmer, yellow, less numerous; eczema gone; vomiting less frequent; meteorism, commencing rachitis. Dec. 14, weight 5,000 gm., diarrhœa since a few days; intertrigo. Jan. 14, 1896, weight 5,700 gm; child much improved; stools normal; no vomiting. Feb. 14, weight 6,200 gm; marked change for better; increase in fat; digestion] normal. March 25, weight 6,850 gm., progressive improvement. April 30th, weight 7,300 gm.; all signs of rickets present; otherwise good health. Final result: Patient came under treatment at age of four months, with a weight of 3,250 gm., (the minus in weight being 2,700 gm.) In the course of six months the child should have gained in weight 2,550 gm. under normal conditions; the actual increase, however, was 4,050 gm. While at the commencement of treatment the difference between the actual weight and that which should have belonged to a child of the same age amounted to 2,700 gm., this had fallen to 1,200 gm. in the course of six months.

---

*The figures in parenthesis represent the weight of a healthy infant of same age, nursing at the breast.

Case 4.—Frank Starkbaum, aged six weeks, weight 3,060 gm. (4,350 gm.), previous nourishment, milk and tea. When admitted Oct. 25, 1895, very emaciated; skin dry and scaling; frontal fontanelle large and sunken, cranial bones overlapping; meteorism; stools numerous, fluid, containing firm whitish flakes; vomiting. Oct. 28, condition unchanged; decrease of bodily weight. Nov. 4, weight 2,850 gm.; persistent dyspeptic disturbances. Nov. 8, death after two weeks' treatment.

Case 5.—Marie Bartek, aged three months weight 3,900 gm. (5,350 gm.); nourished on diluted cow's milk. Jan. 31, 1896, when admitted, skin can be lifted up in large folds; marked pallor; diffuse furunculosis; three fluid, green fetid stools daily; vomiting. Feb. 7, weight 4,200 gm.; three watery, yellowish stools, less ill-smelling. Feb. 18, weight 4,300 gm.; four yellow, pasty stools, partly of greenish color; meteorism; no vomiting. March, 6, weight 4,500 gm.; yellow, soft stools, patient much more quiet. March 20, weight 4,600 gm.; reappearance of dyspepsia. March 30, weight 4,700 gm.; general health good. Final result: Although the dyspepsia yielded to treatment, the child gained 350 gm. less in weight during this period than a healthy child of the same age.

Case 6.—Benedikt Jagschitz, aged five months, weight 4,800 gm. (6,500 gm.), nourished on diluted cow's milk. On admission, Oct. 22, 1895, considerable emaciation; skin covered with numerous scars due to incisions for severe furunculosis; cranial sutures gaping; fontanelle sunken; rickets, meteorism; vomiting; sluggish bowels; after irrigation evacuation of white firm masses. Nov. 5, weight 4,950 gm. Two yellow, pasty passages containing green, lumpy masses, no vomiting. November 22, weight 5,200 gm.; stools normal; no vomiting. Final result: During one month's observation gained 400 gm. in weight, which is 100 gm. less than a breast-fed child of same age. The dyspepsia subsided.

Case 7.—Rudolph Kraft, aged six weeks, prematurely born at seven months; weight 2,800 gm. (4,350 gm.); previous nourishment, milk and tea. On admission, Feb. 17, 1896, complete disappearance of panniculus adiposus; skin loose, wrinkled and scaling; cranial bones overlapping, extensive sprue in mouth; one stool daily, brownish and of firm consistence, frequent vomiting, convulsions. February 24, weight 3,000 gm.; numerous yellow, watery stools; frequent vomiting; convulsions. February 28, weight 2,900 gm.; diarrhœa, vomiting. March 10, weight 2,400 gm.; intestinal catarrh, persisting loss of strength. Final result: Death March 14; original weight much reduced; there being a minus of 1,550 gm.

Case 8.—Marie Lohr, aged five months; prematurely born at eight months; weight 3,000 gm. (6,500 gm.); previous nourishment, diluted cow's milk. On admission, Feb. 12, 1896, child found remarkably retarded in development; very small (measuring 47 cm.) and emaciated; cranial bones overlapping; eyes sunken; drawn features; marked degree of marasmus. Stools frequent and lumpy, of partly green and partly yellow color; of extremely fetid odor; frequent, projectile vomiting; great restlessness. On Feb. 26, weight 3,100 gm.; one very firm stool daily; no vomiting; much less restlessness. March 4, weight 3,150 gm.; two watery, yellow stools daily, of very disagreeable odor; appearance of furuncles; restlessness. March 10, furunculosis diffused over entire body; two abscesses on head the size of a nut. March 14, weight 3,000 gm.; much reduced by furunculosis; patient moans; abdomen feels as hard as a board. March 17, weight 3,030 gm.; one stool daily of pasty consistence and gray color. March 23, child given to a wet-nurse. Final result: At commencement of treatment a distinct increase in weight was determined, and not until the appearance of severe furunculosis was an arrest and decrease of weight observed. In consequence of this there was present at the close of treatment instead of a normal increase of 500 gm., an increase of only 100 gm. It may, therefore, be assumed that unless an intercurrent disease had appeared the child would have thrived under Somatose alimentation.

Case 9.—Barbara Schmidt, aged three months; weight 3150 gm. (5350 gm.); previous nourishment, diluted cow's milk. On admission, Feb. 25, 1896, emaciation; overlapping of cranial bones; face resembles that of an aged person; eczema; intertrigo, meteorism; three to four stools, containing white lumpy masses, daily; frequent vomiting. March 7, weight 3,250 gm.; four to five yellow, pasty stools daily; vomiting less frequent. March 17, weight 3,400 gm.; two to three yellow, pasty stools; no vomiting. March 23, weight 3,550 gm.; normal digestion. April 17, weight 3,750 gm.; patient feels well. April 24, weight 3,900 gm.; health remains good. Final result: After two months treatment face somewhat fuller; slight increase in adipose tissue; no meteorism; digestion normal; increase in bodily weight 750 gm.; while a breast-fed of same age and of normal development should have gained 1,150 gm. in the same time.

Case 10.—Charlotte Scheidovitz, aged six weeks, weight 3,350 gm. (4,300 gm.); previous nourishment, Gartner's fat-milk. On admission, March 7, extreme emaciation; panniculus adiposus has almost completely disappeared; skin yellowish, pale, much relaxed; cranial bones soft; sutures diastatic; fontanelle situated beneath niveau of skull; erythema around the anus; meteorism; extensive layer of thrush in mouth; stools at frequent intervals, watery, greenish, contain solid particles, and are of disagreeable odor. March 13, weight 3,500 gm.; two to three yellow, soft stools; thrush cured; meteorism has disappeared; patient much more quiet. March 27, weight 3,850 gm.; normal digestion April 10, weight 4,250 gm. May 2, weight 5,000 gm.; persisting improvement in health. May 26, weight 5,600 gm. Final result: Child came under treatment with a minus of 950 gm. in weight, and at the end of two months had attained the normal weight belonging to its age. The increase during the period of observation was 2,250 gm., *i. e.*, 1,300 gm. more than the normal.

Case 11.—Frederick Latzeck, aged six months; weight 4,300 gm. (7,000 gm.); previous nourishment, Ottkg infant milk. On admission, March 1, extreme emaciation; pallor, skin of neck and extremities present lanugo; intertrigo around genitals; eczema; frequent watery, yellowish-green stools; vomiting. March 9, four to five pasty stools, varying in color from yellow to green, mixed with lumpy masses; considerable meteorism; vomiting less frequent. March 16, weight 5,000 gm.; since two days lobar pneumonia; digestion not disturbed. March 22, weight 5,200 gm.; pneumonia subsiding; digestion normal. March 29, weight 5,550 gm.; soft, yellow stools three times daily; no vomiting. April 10, weight 5,600 gm.; normal stools. April 27, weight 6,050 gm.; general health good. May 1, weight 6,300 gm; favorable condition continues. Final result: At the age of six months, the bodily weight was 2,700 gm. less than the normal. In the following two months, patient gained 2,000 gm.; while the normal increase characteristic of that age corresponds to 850 gm. The difference between the normal and the actual weight, therefore, was reduced from 2,700 to 1,550 gm.

Case 12.—Hermine Wallinger, aged four months; weight 2,800 gm. (5,956 gm.): previous nourishment, Gartner's fat-milk. When admitted, Feb. 27, 1896, emaciated to skin and bones; cranial bones overlapping; frontal fontanelle depressed; skin of face wrinkled, can be lifted up in large folds over entire body; nucha and extremities covered with lanugo; meteorism; frequent green watery passages; marked restlessness; frequent vomiting. March 2, weight 3,000 gm.; frequent yellow, watery stools; restlessness and vomiting persist. March 10, weight 3,300 gm.; two or three whitish, soft stools; vomiting infrequent. April 1, weight 3,650 gm.; three to four pasty stools. April 14, recurrence of diarrhœa; no increase in weight. April 21, weight 3,800 gm.; soft, yellow stools. April 30, since a few days, furunculosis, restlessness, occasional vomiting, two to three soft, yellow stools. May 5, weight 3,950 gm. May 27, weight 4,700 gm.; feeling well. Final result: During three months treatment, an increase of weight of 1,900 gm., occurred. The gain in weight during normal development at this age would be 1,500 gm.; hence there has been a plus of 400 gm.

Case 13.—Josef Herbek, aged five months, weight 3,200 gm. (4,150 gm.); previous nourishment, diluted cow's milk. On admission, Feb. 24, extreme emaciation; great pallor; fontanelle sunken; sutures diastatic; facial integument wrinkled; frequent vomiting; six to seven, watery, dark brown stools, having a disagreeable odor. March 4, weight 3,300 gm.; five to six pasty stools, of yellowish-green color; vomiting has ceased. March 18, weight 3,600 gm.; up to two days ago yellow, soft stools; discontinuance of Somatose followed by diarrhœa, extensive eczema, intertrigo. March 26, weight 3,800 gm.; normal evacuations; no vomiting, quiet sleep. April 7, weight 4,150 gm.; health good. April 24, weight 4,750 gm.; normal digestion; health fully restored. April 30, weight 4,950 gm. Final result: Patient came under treatment with a minus of 950 gm. The increase during the two months treatment should have amounted to 1,350 gm., under normal conditions; but the child gained 1,750 gm. The initial difference of 950 gm. was, therefore, reduced to 550 gm.

Case 14.—Hermine Spanichel, aged seventeen days; prematurely born at eight months, weight 2,500 gm.; previous nourishment, cow's milk and tea. March 13, on admission, child found to be small (48 cm.) and emaciated; skin dry, covered with brownish, bran-like scales; on back lanugo; face haggard and pale; mucous membrane of mouth pale, with extensive deposit of thrush; bronchitis; abdomen distended; parts surrounding anus erythematous; one stool daily, very solid and of brown color; frequent vomiting. March 20, weight 3,000 gm.; thrush disappeared; two or three soft, yellow stools; vomiting less frequent. March 27, weight 3,400 gm.; three to four, formed yellow stools, with occasional admixture of green particles; occasional vomiting. April 1, weight 3,500 gm; two to three yellow, soft stools; no vomiting. April 7, weight 3,650 gm.; two to three yellow, pasty stools. Continued good health. May 23, weight 4,600 gm. Final result: After ten weeks treatment patient gained 750 gm. less in weight than a healthy child of same age; but it must be remembered that the patient came under treatment in the most wretched condition of nutrition.

Case 15.—Josef Hugaick, aged six months weight 4,300 gm. (7,000 gm), previous nourishment, milk, tea and bread soup. When admitted, March 11, extremely emaciated and very pale; diarrhœa, evacuations being frequent; violent vomiting; great restlessness; meteorism. March 18, weight 4,450 gm.; two to three yellow, watery passages mixed with whitish lumpy masses; restlessness; vomiting infrequent. April 1, weight 4,700 gm.; two to three yellow, soft stools; no vomiting. April 10, weight 4,800 gm.; patient feeling well. April 17, weight 4,950 gm.; continued good health. Final result: During the short period of observation (patient was unfortunately withdrawn from treatment too early) the child gained 100 gm. more than a normally developed breast-fed infant of same age.

Case 16.—Marie Schild, aged two months, weight 3,800 gm. (4,700 gm.); previous nourishment, diluted cow's milk.

March 30, 1896, very emaciated and pale; diarrhœa. April 4, weight 4,000 gm.; five fluid, yellow stools. April 16, weight 4,400 gm.; two or three yellow, soft stools. April 30, weight 4,500 gm.; stools normal; complete restoration of health. Final result: Increase in weight 50 gm., more than that of a normal child of same age without digestive disturbance during same time.

Case 17.—Marie Gottfried, aged six weeks, weight 3,000 gm. (4,350 gm.); previous nourishment, diluted cow's milk. March 10, on admission, appears pale and emaciated; six to seven watery, ill-smelling stools of yellow color; frequent vomiting; meteorism. March 20, weight 3,350 gm.; five yellow, soft stools daily; vomiting less frequent; only slight meteorism. March 30, weight 3,550 gm., normal digestion; feeling well. April 10, weight 3,600 gm., return of diarrhœa and vomiting. April 24, weight 3,850 gm.; two yellow, soft stools; no vomiting. May 1, weight 3,950 gm.; general health good. Final result: Under normal conditions a child of same age is apt to increase 1,150 gm., in weight during the same period. In this case I can report an increase of only 950 gm., a minus of 200 gm. compared with that of a normal child.

Class 3 comprises 13 cases of dyspepsia in infants and five cases of digestive disturbances in children over one year old.

Case 18.—Hans Baumer, aged eight months, weight 6,900 gm. (7,850 gm.); previous nourishment, Gartner's fat-milk. On admission, January 25, had been suffering for two weeks from diarrhœa, with greenish stools; vomiting; meteorism; marked restlessness. January 27, weight 6,940 gm.; stools less numerous; vomiting persists. Feb. 1, weight 6,960 gm.; one stool daily, soft and yellow; meteorism has disappeared. Until Feb. 20, under treatment; stools continue normal, and health remains good; weight 7,050 gm. Final result: While the dyspeptic troubles disappeared after about one week's treatment, the increase in bodily weight was not satisfactory. As the cause of this must be regarded the low initial weight (about 950 gm. less than normal).

Case 19.—Minna Hauser, aged six months, weight 5,500 gm. (7,000 gm.); previous nourishment, Gartner's fat-milk. When admitted, Feb. 15th, pale, flabby muscles, signs of rickets; meteorism; great restlessness. Stool occurs only after irrigation, which is followed by a profuse discharge of clay-like, brownish or white fecal masses. Occasional vomiting. Feb. 23, weight 5,650 gm.; bowels move with difficulty, after violent pressure and marked restlessness, evacuations of hard, light, yellow, fecal masses; vomiting has ceased. March 4, weight 5,850 gm.; once daily, brown, formed, quite solid passage. March 10, weight 5,950 gm. Since two days watery yellow stools containing white masses; meteorism has completely disappeared. March 20, under use of Somatose stools remain soft and are evacuated without difficulty. Final result: The dyspeptic troubles have completely subsided. Normal bodily weight, in spite of a low weight at beginning.

Case 20.—Victor Klebe, aged three months, weight 4,150 gm. (5,350 gm.); previous nourishment, milk, soup, bread pap. On admission, Feb. 6, patient pale, thin, rachitic; frequent belching, vomiting; diarrhœal green stools; child cries much and sleeps little. Feb. 17, weight 4,210 gm.; two to three brown ill-smelling stools, no vomiting. Feb 24, weight 4,400 gm.; two to three formed stools of brown color; restlessness has disappeared; no vomiting. Feb. 28, weight 4,500 gm; normal stools, no vomiting. Somatose discontinued. March 4, weight 4,500 gm.; one firm yellow stool; vomiting and colicky pains; restlessness. March 16, weight 4,600 gm.; two to three brown, soft stools; vomiting less frequent; much less restlessness. March 23, normal stools; health continues good. Until April 17, under observation, weight 5,300 gm. Final result: Increase of weight during nine weeks' observation was 1,150 gm.; while under favorable conditions children of same age would increase 1,200 gm. in weight in the same time.

Case 21.—Jeannette Herches, aged two months; weight 5,500 gm. (4,700 gm.), previous nourishment, diluted cow's milk. On admission, Feb. 15, it was stated that the child had lost flesh lately, cried much, slept little, vomited frequently, and had numerous green, ill-smelling stools, with meteorism. Feb. 22, child more quiet; four yellow, pasty stools; vomiting less frequent. Feb. 29, weight 5,600 gm.; meteorism has disappeared; digestion normal. Until March 21, remained under observation; weight 6,300 gm.; continued good health. Final result: After five weeks' treatment, increase of bodily weight amounted to 800 gm., which represents 100 gm. more than the normal.

Case 22.—Carl Urban, aged four months; weight 5,700 gm. (5,950 gm.); previous nourishment, cow's milk and milk porridge. On admission, Feb. 23, the history given was that the rachitic child had lately emaciated greatly; numerous watery, green stools; frequent, violent vomiting, and great restlessness. March 1, weight 5,800 gm.; once daily, a very firm, yellow stool; occasional vomiting. March 6, weight 5,850 gm.; once daily, firm, yellow stool; no vomiting; more quiet. March 15, normal digestion; feeling well. Under observation until March 24; weight 6,300 gm.; continued good health. Final result: Increase of bodily weight equivalent to that of a healthy child of same age.

Case 23.—Johann Pascher, aged two months; weight 4,300 gm. (4,700 gm.), previous nourishment, cow's milk and rice. When admitted, March 7, the child was said to have emaciated considerably. Colicky pains; three to four stools daily, of yellow color, mixed with white masses of undigested food; frequent vomiting. March 23, weight 4,800 gm.; the child has recuperated well; the face is again full; normal stools; no vomiting; quiet sleep. Final result: The increase in weight amounted to 150 gm. more than under normal conditions in child of same age. During subsequent period of observation child thrived well.

Case 24.—Rudolph Hadatzel, aged two months; weight 3,500 gm. (4,700 gm.); previous nourishment, milk and tea. On admission, March 1, very emaciated; skin dry and pale and yellowish; frequent diarrhœal evacuations; vomiting; meteorism; restlessness. March 6, weight 3,550 gm.; four to five soft, ill-smelling stools, partly of green and partly of yellow color; vomiting less frequent. March 9, weight 3,600 gm.; four times daily, light yellowish, soft stool; occasional vomiting; meteorism. March 16, weight 3,900 gm.; three yellow, soft stools; no meteorism; patient much brighter. March 22, weight 4,200 gm.; three to four yellow, soft stools; child recovering perceptibly. Final result: During the short period of observation, the increase in weight exceeded by 250 gm. the normal.

Case 25.—Aloisia Herschmann, aged three months; weight 4,950 gm. (5,350 gm.); breast-fed until recently, then nourished on cow's milk. On admission, March 6, three to four watery, green, ill-smelling stools; vomiting. March 13, weight 5,100 gm.; normal stools; feeling well. Final result: During further observation, continued good health.

Case 26.—Marie Weber, aged three months; weight 5,800 gm. (5,350 gm); previous nourishment, cow's milk and Russian tea. On admission, March 10, four to five watery, very fetid evacuations of yellow color; vomiting; lately emaciation. March 16, weight 5,950 gm.; yellow, soft stool twice daily; vomiting less frequent. March 25, weight 6,100 gm.; feeling well. Final result: Health continues good.

Case 27.—K. Stecher, aged seven months, previous nourishment, cow's milk. Since two weeks persistent diarrhœa. At end of three days under use of 8.0 gm., Somatose soft stool.

Case 28.—Adolph Geyer, aged two months; weight 4,000 gm. (4,700 gm.); previous nourishment, milk, soup, tea. When admitted, March 3, emaciated, pale, considerable meteorism; restlessness; two or three very firm stools. March 24, weight 4,700 gm.; three to five yellow, soft stools;

no vomiting, patient bright; sleeps well. Under observation until April 10; weight 5,150 gm. ; complete restoration to health. Final result : The difference at first present between the actual weight and that of a healthy child of same age amounted to 700 gm., but fell to 350 gm., in the course of five weeks treatment.

Case 29.—Ernestine Innek, aged four months ; weight 5,460 gm. (5,950 gm.) ; previous nourishment, cow's milk, mush and milk. Admitted Feb. 20. The rachitic child had lately emaciated considerably; vomits frequently, stool once daily, of yellowish color, containing undigested curds of milk; great restlessness, meteorism. Feb. 26, weight 5,600 gm.; very firm, yellow stools, three times daily; vomiting and restlessness persisting. Feb. 30, weight 5,600 gm.; four times daily, yellow soft stool; vomiting continuing; somewhat more quiet. March 15, weight 5,960 gm.; normal stools; occasional vomiting. Until April 5, child remained under observation; weight 6,200 gm.; stools soft and yellow, sometimes mixed with white flakes; vomiting infrequent. Final result: After six weeks treatment the dyspepsia has not completely disappeared, but, nevertheless, a decided improvement has occurred in the general health. The increase of bodily weight during treatment corresponded to about normal.

Case 30.—Rudolf Leischke, aged six months, weight 6,700 gm. (7,000 gm.); previous nourishment, Gartner's fat-milk. When admitted, March 21, markedly rachitic; eczema of face; stools sometimes clay colored and firm; sometimes diarrhœal; meteorism; restlessness. April 11, weight 7,100 gm.; normal digestion, feeling well; quiet sleep. Under observation until May 15, child thriving well. Final result: After first ten days decided improvement. Continued good health.

Case 31.—Franz Kruschleg, aged fourteen months. Admitted March 10. The rachitic child has suffered since a long time of convulsions and vomiting. The stools, three daily, resemble clay; considerable meteorism; great restlessness. March, 17 the convulsions have not recurred in the last few days; slight meteorism; no vomiting; normal stools. Good health continues during subsequent observation. Final result : The convulsions were evidently due in this case to the dyspepsia. After one week's treatment the dyspepsia disappeared and the convulsive seizures ceased.

Cases 32 and 33.— Rudolf Zipperer, aged three years, and Florian Leitgeb, aged four years. Both were hospital patients in the diphtheria wards, and suffered from profuse diarrhœa. After administration of 3 to 4 gm. Somatose *pro die* the stools became formed, and a cure ensued in the course of two days.

Case 34.—Georg Chalupek, aged fourteen months. Admitted Feb. 20. The markedly rachitic child has suffered since two months of constipation; evacuations can only be obtained with enemata. Until Feb. 25, condition unchanged. Since Feb. 26, patient has stools without aid of enema, but they are still very hard, and patient still experiences pain during passages. This condition lasts until March 10; from then on, one to two evacuations without difficulty. Final result: Until end of March under observation; up to this time, no recurrence of digestive disturbances.

Case 35.—Kath. Mlczoch, aged four years. Admitted March 20. Has suffered since birth of disturbances of bowels; usually constipation for two or three days; lately an evacuation in only every four or five days. Fecal masses extremely hard, and their passage attended with violent pains. Until March 30, no change; later, at intervals of two days, a stool of softer consistence. After April 18, one evacuation daily without trouble. Final result: Defecation remains normal under administration of large quantities of Somatose.

RESUME.—In nearly all cases a permanent increase in weight was observed after administration of Somatose.

The dyspeptic troubles and restlessness usually disappeared promptly.

A decrease in weight was only noted during the occurrence of complicating disorders.

Simultaneously with the gain in weight I observed a diminution of the anæmia. as was shown by an increase in the number of red blood corpuscles.

Contrary to Hertmanni (*Deut. Med. Wochensch.*, No. 82, 1894) I was unable to observe any influence upon the development of rickets.

Somatose seemed to exert a favorable action upon the digestive disturbances of older children.

On the ground of the above mentioned experiments I consider myself justified in drawing the following conclusion:

1. By addition of Somatose cow's milk is rendered more digestible.
2. The milder forms of dyspepsia in infants are favorably influenced by administration of Somatose.
3. Somatose milk is well tolerated by marasmic children.
4. In functional disturbances of the digestive organs of older children good results are obtained from the use of Somatose. —*Allg. Wien. Mediz. Zeitung*, No. XLI, 1896.

◆

CHANGE OF AIR—THE SCIENCE OF IT.*

By Louis Robinson, M.D.

Although "change of air" is one of the most generally recognized means of restoring lost health, very little is known as to the reasons why a temporary removal to a new district is frequently of such great benefit to invalids.

That progress has been made on the practical—as distinct from the purely scientific—side of the subject is made plain by the fact that most of the views and customs prevalent among physicians a hundred years ago have now been almost entirely discarded. Better methods of observation and a more exact habit of recording results of treatment—if not more enlightened theories on the physiological effects of change of air—have enabled us to take several considerable steps in the right direction. It seems odd enough to us in the present day that our great-great-grandfathers and their physicians considered sea air to be peculiarly unwholesome, and spoke warningly of its dampness and chilling effects. The air of mountainous regions was looked upon as raw and trying for delicate lungs. In the olden time dwellings were scarcely ever built on an eminence except for purposes of defence, the more favorite sites being those in sheltered valleys. Most of our ancient mansions and farm-houses occupy damp and low-lying positions, such as no sane modern house-builder would think of selecting. English literature tells the same story. From the time of Elizabeth to that of George the Third we find "fruitful vales" and "shady nooks" continually spoken of as the ideal places for human dwellings. Up to the time of the present generation consumptives were ordered to warm and damp regions such as the West Indies or Madeira, because it was thought that phthisis, "the English disease," resulted directly from the harshness of our climate. A very favorite last resort of the eighteenth century physician was to send a patient to visit the place of his birth, since it was thought that "natal air" would be likely to prove peculiarly beneficial. This last theory, although somewhat ludicrous when viewed from our modern standpoint, strikes us as being something more than a mere piece of plausible empiricism. It shows that, in spite of their terrible faith in physic, the doctors of those days did not lose sight of the importance of conforming to Nature's programme.

CLEAN SEA AND MOUNTAIN AIR.

Although the beneficial effect of sea voyages was to some extent recognized, it is easy to understand that the ships of the seventeenth and eighteenth centuries, damp and stuffy below, and provisioned with salt junk and hard biscuits, scarcely gave a broken-down invalid a fair chance of deriving any great amount of good from a change of air taken under such conditions.

---

* *National Review.*

Generally speaking, we now consider that sea and mountain air owes its virtue to its freedom from organic impurities. Probably it is this quality, more than any other, which gives it its reviving effect on those who have been living in the clogged and polluted atmosphere of large towns. Yet purity of the atmosphere *per se* is no preventive of those very ailments which bring the majority of patients to seaside watering-places and highland sanatoriums. If any invalid who has thus sought relief were to take careful note of the natives of his favorite health resort, he would probably be disquieted to find that pale, sickly children and ailing adults were by no means uncommon. Patients with weak lungs are often sent to winter in Devon and Cornwall, although the mortality from pulmonary diseases among the permanent residents of these favored counties is not a whit less than among the dwellers in the midlands and the north. Yet the undoubted fact remains to be accounted for that such migrants to warmer climes almost always derive marked benefit from the change.

When the late John Addington Symonds first went to live in the searching and rarefied atmosphere of the Engadine, not a few of his friends thought that he was making a fatal mistake, and that he would certainly increase the tendency to phthisis which compelled him to leave England. But since then opinion has so veered round that this Alpine Valley has become one of the most orthodox places of refuge for consumptive patients. Latterly certain dry and elevated parts of South Africa and America have surpassed it in public favor, because it has been found in many cases that the safety of the patient depends upon his remaining permanently away from the bitter winds of Britain; and the colonies offer greater advantages in the way of occupation than do the Alpine regions of Europe.

NOT A QUESTION OF TEMPERATURE.

It is by no means easy to indicate all the reasons why the air of health resorts such as these proves so beneficial in cases of weakness of the lungs. As we have seen, it is not a question of temperature, as our ancestors imagined; and, although dryness may have something to do with it, we find that our parching east winds are peculiarly trying to sufferers from chest complaints. There can be no doubt, however, that the extreme purity of the air in these regions is an important factor in aiding recovery. Consumption, like all other diseases in which micro-organisms are the chief agents of mischief, is, according to the latest medical philosophy, a strife between the constitutional garrison consisting mainly of phagocytes, or white blood corpuscles, and the invading hordes of the enemy. The various characteristic symptoms which arise in the course of such a malady are so many phases of the combat. Many physicians hold the view that the rash on the skin in such diseases as scarlet fever and measles result from the fact that the skin, as an excretory organ as well as the chief frontier line of the body, is a highly important strategic point, and therefore attracts the combatants of both armies. In the near neighborhood of each tiny coiled sweat-gland a deadly strife goes on between the phagocytes and their microscopic antagonists, and the result is a certain amount of redness and irritation of the surrounding tissues. As a rule, the defence and attack are so conducted that the war is prolonged for days or weeks, during which time the forces on each side are nicely balanced. If the invaders can be kept in check in this manner the disease soon wears itself out, for the micro-organisms cannot stand a long siege, owing to the readiness with which they exhaust the provisions around them. There is also good reason for believing that these living poisons provide their own antidotes, for it is found that in places where they have lived a new material has been developed (probably a waste product excreted by the bacteria themselves) which is inimical to their continued existence. It| seldom happens that the human fortress is carried by assault at the first onset; although in some cases of cholera, pneumonia, and in fact nearly all kinds of diseases caused by micro-organisms, such a rapid and fatal termination of an attack may take place within a very short time of the first invasion.

Now, in the air of this thickly populated country it has been abundantly demonstrated that living organisms and disease germs literally swarm. Not only are they set afloat in countless myriads from their breeding places (generally some living fellow-creature), but the humidity and temperature of our atmosphere serve to maintain them for some time in a lively condition and possibly to enable them to increase. It is plain that if we can lessen or abolish the influx of reinforcements the loyal phalanx of phagocytes will have a much better chance of conquering and expelling the foe. One way of bringing this about is the removal of the patient to a climate where the physical wear and tear are somewhat lessened, and where the atmosphere is not only normally free from disease germs, but is inimical to their existence outside the body. All this is fairly comprehensible; but it is evidently not the whole story. There are contiguous regions in South Africa where the air is equally pure, according to physical tests, and yet one proves favorable to consumptive patients and the other rather the reverse. •

A VIRTUE IN MERE CHANGE.

This brings us back to the evident fact that there is a peculiar virtue in mere change. It seems to give a fillip to the whole system, and especially to increase the recuperative power. The persistent languor and debility following an exhaustive illness, such as an attack of influenza or whooping-cough, will ofter disappear like magic under the influence of a change of abode. Nor is it essential that the patient should go to the seaside, or to some spot of acknowledged salubrity. Often the mere removal from one part of a town to another will result in an immediate and manifest improvement. I know of an instance in which a gentleman, a sufferer from asthma and bronchitis, whose home was in a healthy part of Surrey, obtained very great relief by a short residence among the slums of Seven Dials. Children seem especially benefited by a change of air; so much so that it is often found advisable to remove them even during a severe illness. In two cases which occur to us in which such a course was adopted, the little patients had been given up by their medical attendant because they had reached that fatal stage of exhaustion so dreaded by the physician, when all rallying power has ebbed away, and there is no more response to remedial measures. Although it seemed doubtful in both cases whether the children would even survive the journey, an instant improvement took place as soon as the removal was accomplished, and in each case complete recovery followed. Both of these children came from homes where every comfort was provided, and from neighborhoods considered healthful.

We have little doubt that the marvellous vitality of gypsy urchins whom one sees running about clad in an irreducible minimum of raiment in damp and wintry weather, and who are nevertheless as hardy and jolly as young colts, is attributable in a great degree to their constant roving habits. It is well-known that wild beasts in travelling menageries, in spite of the rough and limited accommodation which they have to put up with, are more healthy and live longer than those which have all the care which science and money can provide in the zoological gardens. Among the first elephants to breed in captivity were those in Barnum's travelling show, and this almost unprecedented event asserts in the most positive manner that the circumstances under which the animals lived were more conducive to their general well-being than those of the elephants in Regent's Park, or even in the Government establishments in India. Race-horses, it is said, are more likely to become "stale" and to deteriorate in condition when they are kept in one place than when they are travelling about to different race meetings. Not a few owners of dray horses in London, such as railway carriers, brewers, etc., find it answers their purpose to have a farm in the country, to which the horses are sent for a change when they show signs of failing health.

When we consider how unstable a substance air is, and that on at least six days out of every seven it is continually moving from place to place at the rate of several miles an hour, the difference of character in the atmosphere at neighboring spots, and the constant qualities it maintains at different times in the same locality, are very difficult to explain.

All attempts of chemists to account for these minute aerial differences, which, nevertheless, have so weighty an influence on the bodily health, have hitherto been futile. The chemical composition of air, as far as gaseous inorganic matter is concerned, varies in an extremely slight degree in different localities. Out of doors the proportions of nitrogen, oxygen and arogon remain practically constant in all regions, and carbonic acid varies only to the extent of one part in a thousand even when we compare such extremes as the air on a Swiss mountain top and that in the most densely populated cities. The popular notion that sea air owes its vivifying effects to ozone is not sanctioned by science, for, although a certain amount of that much-vaunted gas is generally present in the air of seaside places, its action for good on the human frame is more than doubtful. On the whole, too much has been made by writers on hygiene of the deleterious effects of carbonic acid, for as long as this gas remains pure and it is unassociated with the deadly carbonic oxide, or "choke damp," it does not seem to produce anything like the serious effects which were at one time supposed to follow from breathing it. Only when it is present in such large quantities as to displace the indispensable amount of oxygen does it endanger life.

Such evidence as we have would seem to indicate that the character of the air in most localities is affected in some subtle way by emanations from the soil, from vegetation, and from other animate and inanimate objects, and that this influence soon ceases when the aerial molecules are wafted away from the spot where it originated. What the nature of the evanescent material may be we are not yet in a position to say, but in most cases it is probably organic. Our delicate sense of smell tells us how full the atmosphere is of extremely attenuated organic matter. Each room, each house, each district, has its distinctive odor, which we are continually recognizing again after months or years of absence, and for which it is often impossible to account. How infinitely minute such odoriferous particles may be has been shown by the familiar experiment with a piece of musk. A small portion of this substance has been known to scent the air of a room for many months without undergoing any appreciable diminution in weight. Nothing seems more likely than that there may be a great number of substances which thus gradually evaporate and impregnate the air without our olfactory apparatus becoming in any way cognizant of them. Considering the well-known depressing or exhilarating effect of many substances (chiefly carbon compounds) which are introduced into the lungs in a vaporized or finely divided state, we are inclined to think that the invisible air-borne matters which may so affect us for good or the reverse are chiefly organic in their origin.

But even if these hypotheses were proved correct, we should yet have to explain the physiological side of the question. The reasons why mere change has such a stimulating effect on the vital forces must be sought within the body itself. Where the relative purity of the atmosphere in two localities is the same the effect of change of air may be of the nature of stimulus to the pulmonary excretory apparatus, so that the system is freed from effete and poisonous material which would otherwise remain and prove deterimental to health. If so, it would be comparable to a change of diet, which often stimulates the excretory functions of the alimentary canal, or to one of the numerous drugs wherewith we aid such operations in various parts of the system. And just as one agent of the latter kind is liable to lose its effect if long continued, so the air to which we have become accustomed may cease to provoke efficient function in the lungs. In fact, when the effect of a change of air is compared with the action of certain medicines, many points of resemblance become apparent. In the case of both, the good results hoped for often reveal themselves only after a certain amount of discomfort and constitutional disturbance.

BIOLOGICAL EXPLANATION.

There are certain biological laws which may help us to understand, to some extent, why a change of air is so conducive to the maintenance or the recovery of health. We have learned, since Darwin's great discovery, to seek for the explanation of widely distributed vital phenomena in the distant past rather than in the present.

Without going back to any prehuman being for evidence we find some suggestive facts in the condition of existence of our primitive ancestors. The discoveries of archaeologists have abundantly proved that civilization, and all the customs and traditions which have followed in its train, are mere modern innovations, and occupy but a very small portion of the long history of the human race. The epoch during which man was a savage hunter, with no fixed place of abode, was so incalculably longer than the most extended estimate of historic time that it is impossible to ignore the influence of such a state of existence upon human nature as we find it to-day. That early man was a wanderer on the face of the earth, like all modern savages who get a precarious livelihood by hunting, is abundantly proved. With the change of the seasons, or as game became scarce in the vicinity of his cave dwelling, he was compelled to migrate from place to place, in search, not of change of air, but of bare sustenance. That such habits, prevalent through so long a period, would be likely to leave a lasting impress on every cell and fibre of the human frame is more than probable. And if these were the prevailing conditions of environment during the manufacture, so to speak, of our physical constitution, it seems reasonable to infer that somewhat similar conditions would be those most favorable to the smooth working of the bodily machinery in modern times. It was found that the unfortunate natives of Tasmania, bred among the hills and woods, perished rapidly when removed to a totally different environment on Flinders Island, and the dwarfs which Stanley discovered in the dense and gloomy forests of the Aruwhimi, only lived a short time if forced to dwell in a more open and sunny region. If, therefore, a race of nomads, to whom vagrant habits had become a second nature, were compelled to live permanently in one spot, one would expect that some evil consequences would ensue, and that these would be especially liable to show themselves when the general vitality had been lowered by disease. And, conversely, it seems reasonable to conclude that a renewal of the conditions to which the constitution of man was originally adapted contribute to the recovery of a normal state of health.

DISINFECTION.

During the winter season some forms of infectious and contagious diseases are more prevalent than others, such as scarlet fever, diphtheria, small-pox and measles. It is well for every one to possess some knowledge of the methods of infection, as by the prompt application of these germ destroyers the spreading of disease may often be arrested. Health Boards are usually ready to supply printed instructions regarding the proper use of disinfecting agents and persons should acquaint themselves with the subject not only as a means of home protection but for the public weal. It should never be forgotten, however, that sunlight, pure air, and cleanliness, are the most powerful preventives in combating disease. Too much reliance should not be placed in the proprietary disinfectants offered the public. While some are of real value others merely serve to disguise bad odors and possess no disinfectant properties. Communication between the patient and others, except the attendant, should be restricted, in infectious cases.—*Health Magazine.*

DIET IN HEART AFFECTIONS.

A WRITER in *L'Union Med.*, Nos. 34 and 35, 1896, in reviewing the various French authorities on the value of diet in relieving symptoms in cardiac affections, devotes the chief part of his paper to milk diet, complete or partial. By complete milk diet he means the prescribing of two and a half to three litres (four to five pints) of milk per diem, to the exclusion of all other food of any kind. This should be continued for at least ten to fifteen days, or longer if indicated. Its value consists in the rest which it gives to the stomach, the kidney and the heart, the diuresis which it produces, and its freedom from "toxines." It can only be of real service in cases when it is well tolerated. Any acidity which it produces is readily treated by large doses of bicarbonate of soda (dr. i to oz. iss.) The cases in which it is of most value are: (1) Reflex palpitations of gastric origin; (2) simple hypertrophy or dilatation of gastric or renal origin; (3) simple or gastralgic dyspepsia in early stages of heart disease; (4) renal disease secondary to heart affection—very valuable; (5) arterio sclerosis—of alcohol or gout—very valuable, and should be returned to for short periods (three to five days) every fortnight or month. In late asystolic conditions, where all the organs are affected, and the dyspnea is not only mechanical but also toxic in origin, milk diet is useful, but should not be continued too long. When the dyspena ceases, eggs and vegetable soup may be added and the milk reduced to one litre (one and a half pints) per diem. Later, well cooked, easily digested meat or fish, may be added, but the milk should not be left off entirely. If the dyspnea returns, full milk diet should again be resorted to.—*Med. Chronicle.*

Vol XII. No. 12. DECEMBER. 1896.

THE DIETETIC AND HYGIENIC GAZETTE

A·MONTHLY·JOURNAL OF PHYSIOLOGICAL·MEDICINE

EDITORS

J·HOBART EGBERT, A.M., M.D., Ph.D.
DEPARTMENT OF PHYSIOLOGICAL CHEMISTRY

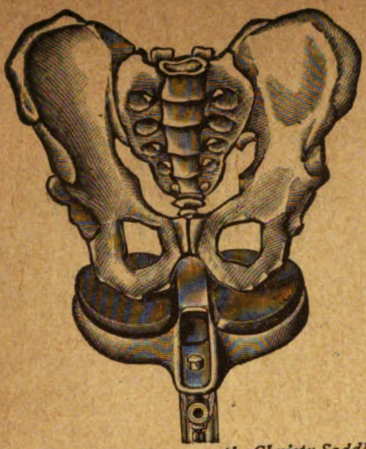
HENRY LEFFMANN, A.M., M.D., Ph.D.
DEPARTMENT OF HYGIENE, STATE & PREVENTIVE MEDICINE

J·CLARKE·SLAY, M.D.
DEPARTMENT OF PHYSICAL EDUCATION

YEARLY SUBSCRIPTION $1.00 · SINGLE NUMBER 10 CENTS
THE GAZETTE PUBLISHING Co.
1218 BROADWAY·NEW YORK
G.R.HALM

COPYRIGHT 1896 BY THE GAZETTE PUBLISHING CO.

CONTENTS ON PAGE VII.



(*Shows pelvis as it rests on the Christy Saddle.*)

Christy Anatomical Saddle.

(*Shows pelvis as it rests on the ordinary saddle.*)

The only saddle that is built on anatomical principles. Used, recommended, and endorsed by all physicians who are cyclists. It is made of aluminum, has thick cushion pads where pads are needed, cannot possibly wear out and will last a lifetime.

Pronounced perfect by the medical profession. If it is fitted to your bicycle, there will be no chafing, stiffness, or soreness, and riding will be made a pleasure. Price, $5.00.

A. G. Spalding & Bros.,
NEW YORK, CHICAGO, PHILA.

A Physician's Opinion of the Christy Saddle.

The following is an extract taken from a letter from Dr. Wm. S. Cheesman, of Auburn, N. Y.:

"I want to add that I have been recommending the Christy Saddle freely to my patients, particularly ladies. It is much the best saddle in the market for them. Our medical journals are constantly full of articles on the medical aspects of bicycling, and all writers on this topic bewail the lack of some suitable saddle which will touch the body only on the bones of support. I have called the attention of many doctors to the saddle, but none had ever seen it, and all at once recognized its merits and ordered one for their own use."

(Signed) "WM. S. CHEESMAN, M.D."

Upon receipt of 14 cents to cover postage, ¼ pound sample will be mailed to any regular registered Physician in the United States, of

KEITHS' CON. TINC. AVENA SATIVA,
From Common Oats,
A Powerful Nerve Stimulant, Tonic, Etc.,
Is employed in the treatment of
All Diseases of the Nervous System.

DOSE.—From ten to thirty drops or more, as often as may be indicated to meet the urgency of the case. Administer in hot water when quick action is desired.

Price: 2 oz., 45c.; 4 oz., 75c.; 8 oz., $1.35; 16 oz., $2.50.

Send for printed matter on Con. Tinc. Avena Sativa in the Morphine or Opium Habit, and certificates from different members of the medical profession citing cases under their charge treated by it, also **REVISED AND ENLARGED MANUAL** to

B. KEITH & CO., ORGANIC CHEMISTS,
No. 75 WILLIAM ST., NEW YORK.
ESTABLISHED 1852.

THE FOREST MASSAGE ROLLERS

No. 1. (6 Wheels), $2.25.
No. 2. (4 Wheels), $2.00.

No. 3. (3 Wheels), $1.75.
No. 4. (5 Wheels), $2.50.

To enumerate the uses for this instrument would almost be to name the conditions for which massage may be employed. It is particularly useful for careful manipulation in painful affections, such as the neuralgias, muscular and articular rheumatism and rheumatic gout, exudations and swellings, sprains, etc. In massage of the head, the Roller may be used over a cloth or towel and will thus avoid pulling of the hair.

The quickly intermitting pressure from the rolling drives the blood rapidly and vigorously through the tissues and thus hastens cell change and renewal of tissue. The rolling may also be used as a means of relief for stiffness, languor, and fatigue.

Address all orders to

THE GAZETTE PUBLISHING CO.,
1218 Broadway, - New York.

3 OUT OF EVERY NINE CHILDREN

Wasting Diseases

die before they reach their fifth year. Rotch, of Boston, in his classic work, "Pediatrics," says: "In the latter part of the first year tuberculosis becomes very common." Add to this all cases of malnutrition, gradual decline, thinness, pallor, and other "wasting diseases" and you have a list of affections which call for

Scott's Emulsion

of Cod-liver Oil with Hypophosphites. The oil is a food, partly digested, and promptly assimilated. The hypophosphites impart strength and activity to the nervous system.

Scott's Emulsion More Than Feeds

It changes unhealthy action to one of health. It increases the red blood corpuscles. It is a tonic and an alterative.

To prevent substitution, Scott's Emulsion is put up in two sizes at 50 cents and $1.00. Kindly prescribe it always in the unbroken package.

SCOTT & BOWNE, Mfg. Chemists, New York

ARTIFICIAL LIMBS

WITH

RUBBER HANDS AND FEET.

New Patents of 1895.

Mr. Wm. Harmes is station agent and baggage master at Parksville, N. Y. In 1884 Mr. Harmes became the victim of a railway accident which necessitated the amputation of both of his legs. Five months after he provided himself with a pair of Marks' Patent Artificial Legs. In a few days he was enabled to walk about without the aid of a cane.

Mr. Harmes says; "With Marks' Rubber Feet and Patent Legs I am able to handle boxes, barrels and trunks weighing 125 pounds. I can carry them and place them on a car without help. I can get on and off a train when it is moving at the rate of fifteen miles an hour. I can walk as far as any ordinary walker."

Over 17,000 in use, scattered in all parts of the world. Received 26 Highest Awards.

Marks' Patent Artificial Limbs are purchased by the United States Government, many Foreign Governments, and the following organizations

Atchison, Topeka & Sante Fe R. R. Ass'n
Augusta & Knoxville R. R.
Baltimore & East Shore R. R.
Baltimore & Ohio R. R. Ass'n.
Berlin Iron Bridge Co.
Booth S. S. Co., Ltd.
Boston & Albany R. R.
Boston & Maine R. R.
Burlington & Missouri River R R.
Central New England & Western R. R.
Central R. R. of New Jersey.
Central Vermont R. R.
Charlestown & Savannah Ry.
Chesapeake & Ohio Ry.
Chicago, Cincinnati & St. Louis Ry.
Chicago & Northwestern Ry. Co.
Cincinnati & Muskingum Valley Ry.
Colorado Fuel & Iron Co.
Continental Steamboat Co.
Delaware, Lackawanna & Western R. R.
Delaware & Hudson R. R.
Erie R. R. Co.
Florida Ry. & Navigation Co.
Galv. Harrisb. & San Antonio R. R.
Georgia & Alabama Railway.
Guatemala Cent. R.R. in Cent. America.
Kingston & Pembroke Ry. Co.
Lehigh Valley R. R.
Lousiana & Northwestern R. R.
London & Northwest Ry. of England.
Long Island R. R.
Louisville & Nashville R. R. Co.
Manhattan Elevated Ry.
Marmex-Smith Coal & Mining Co.
Metropolitan Steamship Co.
Nashville, Chattanooga & St. Louis R.R.
New York & Northern Ry.
N. Y., New Haven & Hartford R. R.
Norfolk & Western R
Ohio River R. R. Co.
Old Dominion Steamship Co.
Panama R. R. in South America.
Pennsylvania R. R.
Philadelphia & Reading R. R.
Phila., Wilmington & Baltimore R. R.
Pittsb. Cincin. Chicago & St. Louis R. R
Red Star Line Steamship Co
Richmond & Danville R. R.
St. Louis, Arkansas & Texas . R.
South Bound R. R.
Staten Island Rapid Transit R. R.
Surry, Sussex & Southampton Ry.
Union Pacific System.
West Jersey R. R.
West Jersey & Seashore R. R. Co.

And other Transportation Lines.

A treatise of over 400 pages, with 300 illustrations, and copyright formula for taking measurements sent free.

A. A. MARKS, (Established 43 years) 701 BROADWAY, NEW YORK.

And the Blessings of Your Patients.

This business of ours is a business to be sure. The practice of medicine is a business too, in the sense that livings are made at it.

Making Sterilizers and practicing medicine are more than businesses because both work in the direction of helping health and saving life.

The Arnold Sterilizer and Pasteurizer has saved the lives of thousands of little babies. It is the only safe, certain and perfectly convenient apparatus for rendering cows' milk germless.

It can come to its highest, broadest state of usefulness only by the general recommendation of leading physicians.

'WE WANT YOUR GOOD WORDS IF WE DESERVE THEM"

WILMOT CASTLE & CO.,
20 ELM STREET, ROCHESTER, N. Y.

ANGIER'S PETROLEUM EMULSION
WITH HYPOPHOSPHITES
THE FLESH-FORMING NUTRIENT

NO DISGUSTING TASTE
NO STOMACH DISTURBANCE
AN AID TO DIGESTION

A Repairer of Waste
A Sure Relief for Cough

ANGIER CHEMICAL COMPANY, Boston, Mass.

Two Sizes—6 and 12 oz.
DOSE—Two teaspoonfuls four times a day in water, milk, wine or other vehicle.

Popular Education.—"John, where's your daddy?"

"He's out yonder gittin' beat for Coroner."

"An' yer uncle?"

"Seein how close he kin com ter bein' Sheriff."

"An' Bill—where's he?"

"Well, Bill don't amount to much, and I've hearn tell they're gwine to send him ter Congress ter get shet of him."

"An you—what's you a-runnin' fer?"

"Nothin. I'm the only one in the family what ain't got no eddication, so I'm teachin' school fer a livin'."—*Atlanta Constitution.*

TRADE MARK REGISTERED.
DYSPEPSIA FLOUR.
Also Special Diabetic Food, Barley Crystals, and Patent Biscuit, Cake and Pastry Flour.
Unrivaled in America or Europe.
Pamphlets and Baking Samples Free.
Write Farwell & Rhines, Watertown, N. Y., U.S.A.

THE SECOND SUMMER.

Many mothers believe, is the most precarious in a child's life; generally it may be true, but you will find that mothers and physicians familiar with the value of the Gail Borden Eagle Brand Condensed Milk do not so regard it.

Established 1780.

Walter Baker & Co., Ltd.

DORCHESTER, MASS.,

The Oldest and Largest Manufacturers

.. of ..

PURE, HIGH GRADE

COCOAS

AND

CHOCOLATES

on this Continent.

No Chemicals are used in their manufactures.

Baron von Liebig says Cocoa Preparations of *good quality* agree with dry temperaments and convalescents; **with mothers who nurse their children;** with those whose occupations oblige them to undergo severe mental strains; with public speakers, and with all those who give to work a portion of the time needed for sleep.

Buyers should ask for and be sure that they get the genuine

Walter Baker & Co.'s

goods, made at

DORCHESTER, MASS.

INFLUFNCE OF SUGAR ON THE ENERGY OF THE MUSCLES.

Schumburg states that he has been experimenting with Mosso's ergograph to determine whether sugar increased the muscular power, as some assert, or whether the increase in energy observed is due to psychic influences. He found that the sugar produced no perceptible effect on fresh, unfatigued muscles, but that muscles fatigued from previous severe exertion were strengthened to a noticeable degree. This effect was attained whether the muscles were strong or weak.—*Deutsche medicinishe Wochenschrift*, *August 20.*

Bound Volumes of the GAZETTE for 1893 and 1894 may be obtained by sending $2 for each volume to

THE GAZETTE PUBLISHING CO.,
1218 Broadway, New York.

Highest Percentage Extract. ✱ Lowest Percentage Alcohol.
A Mild Stimulant. ✱ An Effective Tonic.

Just what the physician will prescribe for nursing Mothers, Convalescents, and victims of Insomnia or Nervous Disorders resulting from impaired digestion and overwork.

BRAUNSCHWEIGER MUMME

A PURE MALT EXTRACT—A SUBSTITUTE FOR SOLID FOOD.

Bottled for Sale and Delivered Anywhere.

LONG ISLAND BOTTLING CO.
BROOKLYN, N. Y.

A sample free to physicians who mention this journal.

Ready September 1st.

MALTINE

WITH

Wine of Pepsin.

Samples and Literature Free on Application.

THE MALTINE MANUFACTURING CO.,
168 Duane Street, New York City.

1866 to 1896.

A Record Unsurpassed in Medical Annals.

"H. V. C."

HAYDEN'S VIBURNUM COMPOUND.

A special medicine which has increased in demand for THIRTY YEARS, and has given more universal satisfaction in that time to physicians and patients than any other remedy in the United States, especially in

THE AILMENTS OF WOMEN,

AND IN **OBSTETRIC PRACTICE.**

For proof of the above statements we refer to any of the most eminent physicians in this country, who will endorse our record.

NON-TOXIC, perfectly safe, prompt, and reliable. Send for our new HAND-BOOK, *free*, to physicians.

All druggists, everywhere. Caution—Avoid the substitutor.

New York Pharmaceutical Company,
BEDFORD SPRINGS, MASS.

The Gate of Entry

For many infectious diseases is through the alimentary canal; and some one has tersely said that "the digestive tube is the avenue to all vital power." How important it is, therefore, to keep the digestive fluids in a physiologically active condition: 1st to destroy or inhibit any microbic invaders, and 2d, to properly dispose of the individual's nutriment. When the functions of digestion are "below par," **LACTOPEPTINE** will remedy the condition by supplying to the digestive juices the ferments and acids in which they are deficient, thus assisting, in a purely natural manner, towards restoration of normal function. For all digestive ailments **LACTOPEPTINE** is far superior to pepsin alone.

The New York Pharmacal Assoc
Yonkers N.Y.

SEND FOR SAMPLE
OF LACTOPEPTINE TABLETS.

PROPHYLACTIC. **LISTERINE.** **ANTISEPTIC.**

A non-poisonous, non-irritating antiseptic, composed of ozoniferous essences, vegetable antiseptics and benzo-boracic acid; miscible with water in any proportion and in agreeable strength sufficiently powerful to make and maintain surgical cleanliness—asepsis—in the treatment of all parts of the human body.

These properties have won for Listerine a first place in the lying-in room and in the treatment of catarrhal conditions of the mucous surfaces of every locality.

LISTERINE

Listerine alone, in teaspoonful doses, or diluted with one or two parts of water or glycerine, will give entire relief in fermentative dyspepsia.

An ounce of Listerine in a pint of warm water forms a refreshing, purifying and protecting application for sponging the body during illness or health. A few ounces added to the bath enhances its tonicity and refreshing effect.

For the preservation of the teeth, and for maintaining the mucous membrane of the mouth in a healthy condition, Listerine is indispensable. Send to the manufacturers for descriptive literature, interesting and instructive.

Be assured of the GENUINE LISTERINE by purchasing in Original Package.

Lambert Pharmacal Company, St. Louis.

"Without wishing to even question the possible advantages of antiseptic treatment in many cases of excessive intestinal fermentation, I am, however, inclined to lay special stress upon the influence of diet in such disorders. Everything else being equal, it is obvious that the more digestible the food-stuffs ingested, the less tendency there will be for intestinal fermentation. On the other hand, the accumulation of difficultly digestible material in the intestinal tract affords one of the best possible conditions favorable for putrefaction."

Chittenden.—"*Intestinal Fermentation.*"

Peptonised Milk prepared with Fairchild's Peptonising Tubes is a perfectly digestible and absorbable food. Its use precludes all accumulation of unassimilable matter in the intestinal tract.

Fairchild Bros. & Foster,
New York.

TABLE OF CONTENTS.

CONTRIBUTIONS.

Typhoid Fever in Wheeling, W. Va.—An Historical Sketch 725
Modern Street Car Sanitation 728
The Confusion of the Materia Medica Relating to the Theory and Practice of Medicine 730
The Dry Earth Closet, the Greatest Sanitary Necessity in Rusal Districts 732
Food Tablets 748
High Pressure Process of Teaching in our Public Schools Considered From a Medical Standpoint 749
Report of the Committee on Animal Diseases and Animal Foods 751
The Dietetic Treatment of Tuberculosis 754
The Sunday Penalty of Irregular Feeding. . . . 759
Toxicity of the Gastric Juice in Epileptics . . . 760
Metallic Contaminations of Food 762
Observations on the Cleaning of Railroad Passenger Cars 767
The Abuse of Drugs 769
The Fly as a Germ Carrier 775

EDITORIAL.

Diet and Heart Disease 745
Our Daily Bread 761
A Fruitful Cause of Indigestion 777

SELECTIONS.

Bhowani, the Cholera-Goddess 733
The Bacteria in Dead Bodies 744
A Complaint Against the Paris Pasteur Institute 764
Contagion Lurks in the Cup 763
Unclean Bakeries 765
Expectoration in Consumption 766
Prevention of Cholera in Egypt. 768
The Flesh of the Dog as Food 768
Dangers of the Lean Meat Diet 772
The Cause of Intemperance 773
Milk Inspection 774

Contents continued on page ix.

DANIEL POMEROY, PRESIDENT. CHARLES F. DEAN, SECRETARY.

POMEROY COMPANY,

ESTABLISHED 1867. SURGICAL APPLIANCES. INCORPORATED 1873.

17 Union Square, West, New York.

The Pomeroy Frame Truss and Oscillating Water Pads. Orthopedic Instruments. The "Master" Patent Elastic Stocking. Abdominal Supporting Belts.

PARTICULAR ATTENTION TO INFANTS AND CHILDREN.

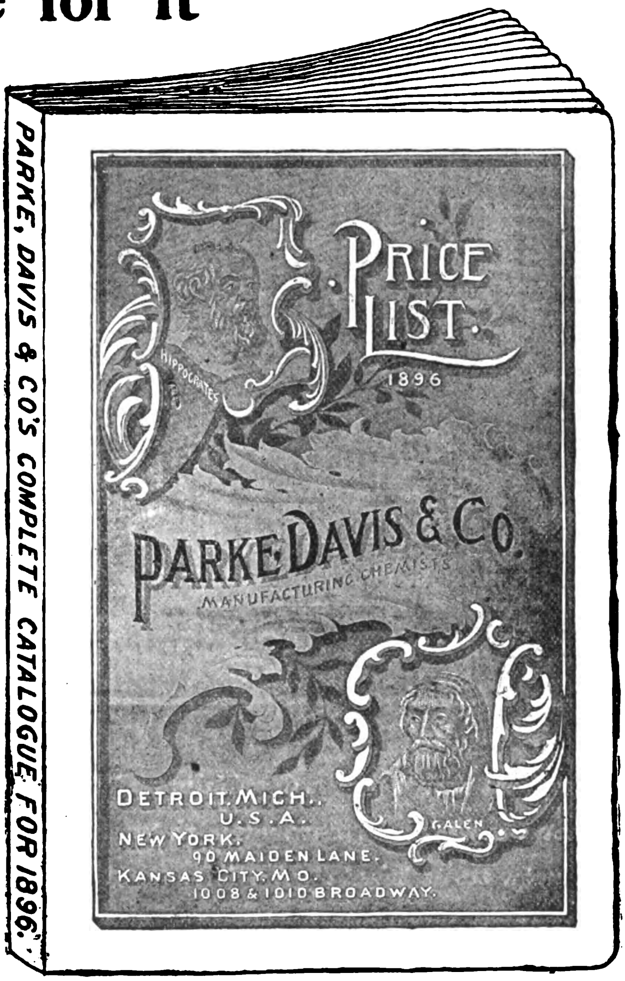
THE FRAME TRUSS FOR Hernia.

Offered only for such cases as can be personally fitted.

A pamphlet, treating of the principles involved in the construction of trusses, and describing the Frame Truss, will be sent on application.

French Trusses, Elastic Trusses, Hard Rubber Trusses and Celluloid Trusses, of the most approved styles, single and double.

Write for it


PARKE, DAVIS & CO'S COMPLETE CATALOGUE FOR 1896.
PRICE LIST.
1896
HIPPOCRATES
PARKE-DAVIS & CO.
MANUFACTURING CHEMISTS
DETROIT, MICH., U.S.A.
NEW YORK, 90 MAIDEN LANE.
KANSAS CITY, MO. 1008 & 1010 BROADWAY.
GALEN

We are in receipt of a handsome Price List from Parke, Davis & Co. Besides being a price list, the book contains much valuable information of a general character. Ask for a copy.—*The National Medical Review.*

The Price List which Parke, Davis & Co. are now distributing is an admirable catalogue in its completeness, convenience of arrangement, and wealth of miscellaneous information. By all means, write the house for a copy.—*Buffalo Medical Journal.*

Messrs. Parke, Davis & Co.'s Catalogue for 1896 is a most useful book of reference for the practitioner, even if he is not interested in the prices. The lists may be perused to advantage as a reminder, and their arrangement is such that they are readily consulted.—*New York Medical Journal.*

Parke, Davis & Co.'s Price List for the current year is not only a price list, but contains much of value to the prescriber, notably one hundred and eighty-three Notes of Reference, which are illustrated, and which should be reviewed by every medical man.—*Colorado Medical Journal.*

Parke, Davis & Co. are now distributing their Price List for '96. They furnish the market with twenty-nine distinct lines of preparations and *six thousand* different products. The List is very convenient for reference, admirably printed, and cleverly arranged. No physician should be without one.—*Medical Fortnightly.*

We have just received the Catalogue and Price List of Messrs. Parke, Davis & Co. for 1896, which is something more than a mere commercial list of medicines with prices affixed. It is a book of pharmaceutical information of great value. There are two hundred and eight pages taken up with a list of medicinal preparations. There are five pages devoted to "Digestive Ferments" and "Food Products." There are twenty-eight pages of "Notes of Reference." There are ten pages of "Synonyms," and a full Index. We are thus specific in reference to this book, for we wish to convey to medical practitioners as near as possible a good idea of the exhaustive and painstaking work which has been performed in the making of this Catalogue. A copy will be sent to any physician on request.—*Dietetic and Hygienic Gazette.*

JUST DROP US A POSTAL CARD.

The Better Known,
The More Approved

The simplicity of the combination is not more important than the method of obtaining the laxative principles of Senna to combine with aromatic carminatives, pure white sugar, water, and a small quantity of the juice or soluble substance of figs, to form the family laxative manufactured by the California Fig Syrup Co., and known to the medical profession by the fanciful name : : :

Syrup of Figs

given to the preparation to distinguish it from all other laxatives. The high standing of the managers of the California Fig Syrup Co. with the medical profession, and its special facilities for manufacturing a perfect laxative, guarantee to physicians the excellence of this product. : : : : : : : : : : : : :

It is never sold in bulk, but in original packages only, which retail at 50 cents per bottle. Physicians wishing to prescribe "Syrup of Figs" may prevent substitutes by having their patients note the name of the California Fig Syrup Co. on the package.

CALIFORNIA FIG SYRUP CO., San Francisco, Cal.; Louisville, Ky.; New York, N. Y.

CONTENTS.—Continued.

A Case of Tuberculosis by Ingestion of a Little Girl of Sixteen Months 775
Löeffler's Bacillus and Diphtheria 776
Tuberculosis of Human Beings and of Fowls Identical 775
Dress Reform for Women Rendered Probable by the Bicycle Costume 778
Something About Clothing: Its Uses and Abuses: With A Pointer for Athletes . . . 779
Treatment of Digestive Disturbances in Children 781
Change of Air—The Science of It 789
Disinfection 793
Diet in Heart Affections 794

INDEX TO ADVERTISERS.

A. G. Spalding . . . . 2d cover
B. Keith & Co . . . . 2d cover
Henry B. Platt . . . . 3d cover
Chas. Roome Parmele Co . . . . . xxviii 3d cover
Armour & Co. . . . . 4th cover
Parker, Stearns & Sutton . . . . 4th cover
A. A. Marks i
Wilmot Castle & Co ii
Farwell & Rhines ii
Walter Baker & Co., Ltd iii
Scott & Bowne iii
The Maltine Manufacturing Co iv
New York Pharmaceutical Company. iv
The Palisade M'f'g Co. v
Lambert Pharmacal Co vi
Fairchild Bros. & Foster vi
Just's Food Company vii
Parke, Davis & Co viii
California Fig Syrup Co ix
Kutnow Bros. x
Battle Creek Sanitarium Health Food Co . . . x
S. Liebmann's Sons Brewing Co xi
Pope Manufacturing Co. xi
Oakland Chemical Co . . . . xii xvii
The Ozomulsion Co. xii
Schieffelin & Co xv
John Carle & Son xv
Dr. Welch xvi
Julius Fehr xvii
H. K. Mulford Co xviii
Rothschilds Bros. & Co xix
Borine Chemical Co . . . . . xix, xx, xxii xxx
Anhauser-Busch Brewing Assn xx
Reed & Carnick xxi
J. S. Tyree xxii
Long Island Bottling Co xxiii
The Antikamnia Chemical Co. xxiii
Medical Novelty Co. xxv
Equitable Chemical Co xxvii
Pre-Digested Food Co. xxvii
Peacock Chemical Co xxix
Sultan Drug Co xxix
Henry K Wampole & Co. xxx
Ripley Spring Water xxx

SEE OPPOSITE PAGE.

DON'T FROWN ON THE ONION.

ITS ODOR MAY BE DISGUISED, AND IT HAS MEDICINAL QUALITIES.

Mrs. Rorer and Dorothy Q.have settled it that onions may be boiled without imparting the odor of a Baxter street tenement to one's domicile, but not yet is the fate of the malodorous though delicious vegetable really decided.

The juice of leeks who fondly sips,
To kiss the fair must close his lips.

Beau Brummel was present at a society called the "Sublime Steaks," when a violent discussion was going on as to whether a gentlemen might eat onions immediately before going into the company of ladies. On being pressed for his opinion, he said:

"No man is so well looking and fascinating that, on entering a ballroom, he can afford to handicap himself with such an odor."

Be that as it may, the onion and its confreres, the garlic, leek, chive, shallot and scallion, are too necessary to the homeliest as well as to the most epicurean fare to be rashly dispensed with. There are other odors on a man's lips that women would dispense with even more readily than with that of the onion, and why not resort to artifice and the pungent clove for disguise in the case of the unfortunate onion also? I am assured, too, that if you will nibble the slightest morsel of cheese after eating onions you may kiss whom you please—as far as the onion is concerned, of course—or go where you will without fear of detection. If the remedy is worse than the disease, try a pinch of ground coffee and a crust of sweet bread.

But onions have medicinal as well as epicurean qualities, and if you would break up a cold in its early stages partake liberally of bisque of onions. Boil a pint bowlful of onions in water, changing three times; when tender add three cups of milk, thicken slightly, season with cayenne and salt, pass through a fine seive and eat

Testimonials may be Good, Bad, or Indifferent.

Every comparative analysis by reputable investigators has been a good testimonial in favor of ∴ ∴ ∴ ∴

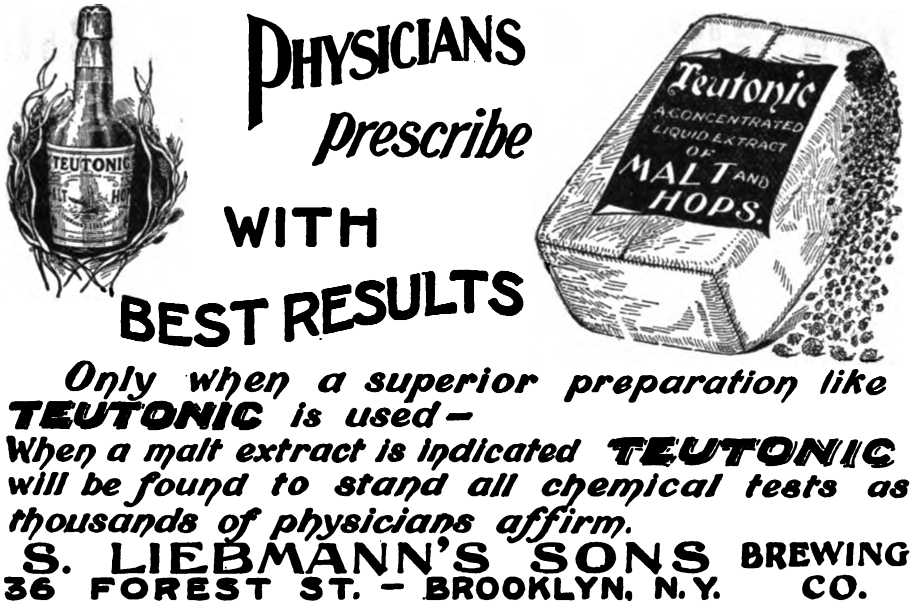
Oakland Hydrogon Dioxide

showing it to be 3 per cent. U. S. P. There is no higher standard of value.

In Throat and Lung troubles, Oakland H2 O2 occupies a distinctly important position. It reduces inflammation, coagulates and disintegrates pus and mucus, supplies oxygen to the blood and controls muscular spasm. Its action is stimulating, vitalizing, and antiseptic.

Sample and monograph containing full instructions for use free on receipt of 15c. to prepay express charges.

The Oakland Chemical Co.,
465 & 467 West Broadway,
NEW YORK.



PHYSICIANS
Prescribe
WITH
BEST RESULTS

TEUTONIC
MALT HOP
Teutonic
A CONCENTRATED LIQUID EXTRACT OF MALT AND HOPS.

Only when a superior preparation like **TEUTONIC** *is used—*
When a malt extract is indicated **TEUTONIC** *will be found to stand all chemical tests as thousands of physicians affirm.*

S. LIEBMANN'S SONS BREWING CO.
36 FOREST ST. – BROOKLYN, N.Y.

very hot. For a brown soup, fry the onions in two ounces of butter, with a pinch of sugar; dredge with an ounce of flour, add a quart of hot broth, boil up and pass through a seive.

Déllée gives four delicious onion soups. A la Chevreuse—Pare, parboil and drain a quart of very small, white onions; cook tender in broth, add a pint of green peas, cooked, a quart of chicken broth and seasonings, and pour over dried slices of French bread. A la Plessy—Peel and parboil four dozen very small onions; fry a light brown with four ounces of butter, drain off the butter and dredge with one and a half ounces of flour; add a quart of cold water and two of veal or chicken broth, with salt and pepper; simmer until tender and pour in a tureen over sippets of dried bread, well sprinkled with grated gruyere cheese.

Another onion soup is made in the same way, frying four large onions sliced, and using beef broth, with parmesan cheese for the sippets. Onion soup with eggs is made by frying four sliced onions until slightly brown, add three pints each of water and broth; boil until tender, and add at the last six egg yolks beaten with a little milk. Pour in the same way over sliced and dried French bread. All odor may be removed from these soups by parboiling the onions before frying.

Oysters with onions, a noted Philadelphia dish, is prepared as follows: Peel four large onions until they are no larger than English walnuts; cut in small dice and fry in four ounces of butter until yellow; add fifty oysters with their juice, salt, pepper cayenne and a pinch of allspice, and as soon as the oysters begin to ruffle their beards finish with two ounces of butter and a tablespoonful of minced parsley.—*N. Y. Herald.*

Oakland Hydrogen Dioxide

is a stable, pure solution of H_2O_2, made in accordance with U. S. Pharmacopoeia requirements, and thoroughly reliable for all medicinal purposes. It is free from pressure upon opening bottle, and retains its strength from four to six months, corked or uncorked.

In DIPHTHERIA, ULCERATIVE PROCESSES, NOSE and THROAT affections, BURNS, LEUCORRHOEA, and in all cases where a non-irritating antiseptic is indicated it is of surpassing value.

Sample and monograph containing full instructions for use, free on receipt of 15c. to prepay express charges.

The Oakland Chemical Co.,
465 & 467 WEST BROADWAY,
NEW YORK.

An Antiseptic Pharmaceutical Combination

Ozomulsion

OZONE—COD LIVER OIL—GUAIACOLA

Completely Ozonized—Slocum's French Electrical Method.

A Physician's sample is too small for practical demonstration. Clinical data can only be obtained from a fair trial. Doctor, on request we will send you free all charges paid, any reasonable quantity for such a trial.

FORMULA.
Each fluid ounce contains 50 per cent. pure Norwegian Cod Liver Oil, 4 drops Guaiacol (purified creosote) thoroughly ozonized.

Prepared only by
The Ozomulsion Co.,
New York, U. S. A.
BRANCHES:
LONDON. PARIS. KARLSBAD.
ROME. MADRID. MONTREAL.
HAVANA. CITY OF MEXICO.

AN excess of Ozone supplied to the blood destroys all micro-organisms and increases the oxidation of effete material.

THE value of creosote in phthisis is lessened by objections to its continued use, owing to its irritating effect upon the stomach.

GUAIACOLA (a perfected guaiacol), representing the refined active principle of creosote—minus the objections—combined with pure Norwegian Cod Liver Oil completely ozonized, forms a reconstructive and tissue builder of peculiar merit.

INDICATED in Tuberculosis, Bronchial Affections, Asthma, La Grippe, Mal-nutrition, Waste, Debility, Scrofula and all Blood Disorders.

Food for the Baby,

If mother can't nourish it; if it is pale and thin, try

Somatose

Mother's Milk.

Somatose is a powder made from the most nourishing elements of meat, and used in proper proportion with sterilized milk forms the best substitute known for mother's milk. Send for formula, mailed free.

At druggists, in 2 oz., ¼, ½ and 1 lb. tins.

Also the following combinations, Somatose-Biscuit, Somatose-Cocoa, Somatose-Chocolate—each containing 10 per cent. Somatose. Very convenient and palatable preparations.

Pamphlets mailed by Schieffelin & Co., New York, agents for Farbenfabriken vorm. Friedr. Bayer & Co., Elberfeld.

Needs no disguise,

Because it is free from all disagreeable taste and odor.

Peter Möller's Cod Liver Oil,

always of the highest standard of quality, is now prepared by a new process, the result of years of scientific investigation, whereby the Oil is kept from atmospheric contact from the beginning of the process of manufacture until it is safely corked up in bottles, thus preventing contamination of any kind and excluding all impurities.

Give this new Oil a trial. Ask for Peter Moller's Oil and see that the bottle—a flat, oval one—bears our name as agents. Notice the date in perforated letters at bottom of the label.

Schieffelin & Co., New York.

"WELL-PREPARED! NUTRITIOUS! EASILY DIGESTED!"—The World's Columbian Commission.

HIGHEST AWARD WORLD'S FAIR

HIGHEST AWARDS WHEREVER EXHIBITED

IMPERIAL-GRANUM

THIS STANDARD PREPARED

FOOD

IS EARNESTLY RECOMMENDED as a most reliable FOOD for Infants, CHILDREN and Nursing-Mothers;—for INVALIDS and Convalescents; for Delicate, Infirm and AGED persons. It is not a stimulant nor a chemical preparation; but a PURE, unsweetened FOOD carefully prepared from the finest growths of wheat, ON WHICH PHYSICIANS CAN DEPEND in FEVERS and in ALL GASTRIC and ENTERIC DISEASES. It is easily digested, nourishing and strengthening, assists nature, never interferes with the action of the medicines prescribed, and IS OFTEN THE ONLY FOOD THE STOMACH CAN RETAIN.

★ **'Physician's-samples' sent free, post-paid, to any physician—or as he may direct.** ★

JOHN CARLE & SONS, Wholesale Druggists, 153 Water Street, NEW YORK CITY, N. Y.

What Some of our Friends Think of the "Gazette."

"WEIGHT AND authority attach to everything in this magazine."—*Boston Herald.*

"SHOULD BE read by every physician, every teacher, every nurse, and every mother."—*The Progressive Age.*

"THE DIETETIC AND HYGIENIC GAZETTE is up to its usual high standard. It easily leads in its special field."—*Sanative Medicine.*

"WITH THE broad purpose of benefiting humanity, this publication attacks every enemy to public health."—*Atlanta Constitution.*

"PREVENTION IS better than cure. THE DIETETIC AND HYGIENIC GAZETTE teaches both scientifically and understandingly how to avoid illness."—*San Francisco Daily Report.*

"THE DIETETIC AND HYGIENIC GAZETTE contains a host of articles on subjects connected with health and eating. There is no magazine published that gives anything like the same wide and varied menu of health and diet subjects as this GAZETTE.—*New Orleans Times Democrat.*

"THE JUNE number of the DIETETIC AND HYGIENIC GAZETTE is, if possible, more than usually interesting. This journal is taking a very much deserved position as a popular scientific work. Although it is prepared especially for the medical profession, it is full of matter of the greatest interest to everyone who would understand how to live aright. The articles it contains are of the greatest scientific merit."—*Pacific Health Journal.*

"THE DIETETIC AND HYGIENIC GAZETTE for January is on our table, and has assumed a new and greatly improved appearance. The title page of the cover is plainer, neater, and more business-like than formerly, and the magazine is gotten up in good taste in every respect, and is a very valuable contribution to the literature on Diet and Hygiene. The doctors all need this journal, and it is remarkably adapted to the wants of the non-professionals as well."—*The Lampasas Leader.*

"THE DIETETIC AND HYGIENIC GAZETTE combines most successfully in its make-up matters of both professional and popular interest. Its more elaborate articles are sufficiently technical to meet the requirements of exactness, but they are not so much so that the intelligent lay reader cannot comprehend them, while there is much matter given designed for his special enlightenment on every-day requirements of healthful living and the care and avoidance of disease."—*Springfield Republican.*

"DIETETICS AND hygiene are becoming more and more important as the years pass, and as the profession becomes enlightened the more. The journal devoted exclusively to diet and hygiene is something which should be welcomed by every physician, and, in fact, should be taken by the public at large. THE DIETETIC AND HYGIENIC GAZETTE, owned and published by Dr. J. Clark Slay, at 1218 Broadway, New York, is entitled to all the success which it has achieved and is likely to achieve. It is one of the most interesting journals, from cover to cover, which comes to our table. We would be glad to see every physician in America a subscriber to the DIETETIC AND HYGIENIC GAZETTE."—*Medical Mirror.*

"THE DIETETIC AND HYGIENIC GAZETTE, New York, is full of prosperity as of years. It is easily amongst the best of the monthly or other journals devoted to physiological medicine. On its editorial staff are J. Hobart Egbert, A. M., M. D., Ph.D., who has charge of the Department of Physiological Chemistry; Henry Leffman, A. M., M. D., Ph.D., of the Department of Hygiene, State and Preventive Medicine, and J. Clarke Slay, M. D., of the Department of Physical Education.—*The American.*

Dr. WELCH'S

Concord

Grape

Juice.

VINELAND, N. J.

Fruit Nutrition in Fluid Form.

DR. W. H. BURT, of Chicago, in his book, "Consumption and Liquids," on page 96, says: "Unfermented Grape Juice is probably the most useful element (outside of milk) we have to commingle with water to form a beverage, * * * it not only contains water, but many of the elements that go to build up the solids of the body, * * * it is not only palatable but very nourishing, and can be drunk longer than any substance I am acquainted with. The best preparation that I have found is that prepared by Dr. Welch, of Vineland."

DR. WELCH'S Concord Grape Juice is full of that peculiar aroma and flavor possessed only by the Concord grape, and it is difficult to retain these in the bottled juice. The delicate grape property and the beautiful deep grape purple are contained in the second or underskin of full-ripe Concord grapes, and, by a process and experience of our own, we are able to save both of them perfect and unchanged. Thus our Grape Juice has all the medicinal properties of the rich, ripe grapes—it is Concord grapes in liquid form.

DR. WELCH'S Grape Juice is specially recommended in Typhoid Fever, Pneumonia, Pleuritis, Peritonitis, Rheumatism, and for Lying-in patients, for Consumption and all forms of chronic diseases, except Diabetes Mellitus. For Aphasia, Pernicious Anemia and the milder forms of this disease, it is remarkably efficacious.

Dr. Welch will send a mail sample (2 oz. bottle) to any physician for 5 cents; if in care of a druggist, no charge.

THE

DIETETIC AND HYGIENIC GAZETTE.

A MONTHLY JOURNAL OF PHYSIOLOGICAL MEDICINE.

THE GAZETTE PUBLISHING CO.,

1218 *Broadway, New York.*

Send the DIETETIC AND HYGIENIC GAZETTE to my address for one year.

Enclosed find $1.50

CLUB LIST.

The "Gazette" and any one of the following New York weeklies, "Sun," "Tribune," "Times" or "World," will be sent for one year upon the receipt of Two Dollars.

Send the "Gazette" and .... *Enclosed find* .... $2.00.

Name of paper.

Name ....

Street No. ....

Town ....

State ....

Date ....

SEE OPPOSITE PAGE.

THE AMERICAN PEDIATRIC SOCIETY

RECOMMENDS THE USE OF **ANTITOXIN**

of "The most concentrated strength of an absolutely reliable preparation"

Tests made by the Bacteriologist of Pennsylvania State Board of Health, (report published in "Public Health," July, 1896,) shows Mulford's Antitoxin to be thoroughly reliable and the most concentrated.

FORTY THOUSAND CASES

LESS THAN 5% DEATHS.... OF DIPHTHERIA.

Is the record of over ten thousand physicians in general practice, with Mulford's Antitoxin.

Mulford's Antitoxin is Supplied in Sterilized Glass-Stoppered Vials. as follows :

"Standard" No. 1,(100 units to each cc.) in vials of 500 units, $1.00; No. 2, 1000 units, $1.75; No. 3,2000 units,$3.25
"Potent" No. 1,(250 units to each cc.) in vials of 500 units, $1.25; No. 2, 1000 units,$2.75; No. 3,2000 units,$4.00
"ExtraPotent" No. 1,(500 units to each cc.) in vials of 500 units, $1.50; No. 2 1000 units,$2.75; No. 3,2000 units,$5.00

Special Syringes for Antitoxin Injection.
The latest treatise on Diphtheria will be forwarded free upon application.

H. K. MULFORD COMPANY,

CHICAGO,
112 & 114 Dearborn St.

CHEMISTS,

PHILADELPHIA.

A SPECIAL OFFER

From **H. K. MULFORD COMPANY,** FACTORS OF RELIABLE TABLETS, **PHILADELPHIA, PA.**

$2.25 WORTH OF TABLETS FOR $1.00.

Bismuth Subnit. and Sodium Bicarb. Comp.

Antacid, Stomachic, Sedative.
For Summer Diarrhœa of Children.

Subnit. Bismuth	1 gr.
Soda Bicarb	1-4 gr.
Calomel	1-24 gr.
Powd. Ipecac	1-50 gr.

Dose: For a child less than 6 months, 1 tablet. 1 year old, 2 tablets. 2 years old, 3 tablets. Give every two hours until stools become normal. Powder tablet if desired. For adults, 4 to 6 tablets every two hours. 200, price, 40c.

Anæmia Improved.

Rapidly increases the number of red blood-corpuscles and percentage of hæmoglobin.

Indicated in anæmia, chlorosis, etc., particularly when accompanied by anorexia.

Arsen. Acid	1-240 gr.
Mercuric Chlor	1-120 gr.
Strych. Sulph	1-80 gr.
Blaud's Mass	q.s. 4 grs.

Chocolate-Coated. Permanent.

Dose: 1 three times daily, after or with meals. 100, price, 40 cents.

Hydriotic Acid, Hypophos. Comp. and Creosote.

(Sugar-Coated.)

A most valuable remedy in Phthisis and for the Sequelæ of Grip, especially where manifested by Severe Nervous Depression and Exhaustion.

Syr. HI, U.S.P	1-4 dr.
Syr. Hypophos., U.S.P	1-2 dr.
Strych. Hypophos	1-64 gr.
Creosote, Beechwood	1-2 gr.

Dose: 1 to 2 after meals.
100, price, 60c.

Analgine.

(Opposed to Pain.)

Indicated in Neuralgia, Migraine, Rheumatic pains; a most valuable analgesic.

Will not depress the heart.

Dose: 1 to 2 tablets. repeat every half hour if necessary, for three doses, and then administer every two to three hours.

100, price, 35c.

Lithium and Sodium Salicylates Effervescent.

Rheumatism or Rheumatic Gout, etc.)

Each tablet contains 3 grs. Lithium with sufficient quantity of Acid. Salicylic and Sodium Bicarb. to prepare 2½ grs. Sodium Salicylate (recens) when the tablet is dissolved in water.

Dose: 1 to 2 tablets dissolved in glass of water 4 times daily.

Price per bottle, 25c.

Anti-Constipation.

Ext. Cascara Sag	1 gr.
Ext. Nux Vom	1-8 gr.
Podophyllin	1-8 gr.
Ext. Belladonna	1-8 gr.
Powd. Ipecac	1-8 gr.

A most excellent combination, owing to absence of Aloin; may be used in constipation attended with hemorrhoids.

Dose: 1 night and morning, in chronic forms. 100, price, 30c.

We make no especial claim for cheapness—our energies are first directed to supplying the Best—Price is then considered and made as reasonable as is consistent with the superior quality of products employed. . . . 50 per cent. of American physicians are now using and have confidence in our Tablets. This confidence we take care never to betray. To those who have not used our Tablets this Special Offer is particularly addressed.

ORDER BLANK

H. K. MULFORD COMPANY, PHILADELPHIA, PA.

GENTLEMEN: You will find enclosed $1.00. Please send me the Tablets constituting your "Special Offer" as advertised in THE DIETETIC AND HYGIENIC GAZETTE.

Name...M.D.

N. B.—Include your file of Antitoxin Literature.

No...............Street..

City......... .... County........................... State...........................

Protonuclein

Is now recognized by those who have carefully studied its effects as the most important therapeutic agent known to the profession.

METCHNIKOFF, who discovered the nature and function of the leucocyte, stated that in his opinion, **"The secret of health will have been discovered when science learns how to increase the number of white blood-corpuscles at will."**

Protonuclein produces leucocytosis as soon as taken into the organism, and in this way becomes nature's tissue-builder and antitoxic principle. It is within the leucocyte that all proteid matter is converted into living substance, there that it receives the impress of life, is changed into a cellulized, vitalized pabulum ready for appropriation by the tissue-cells. Protonuclein is obtained from the lymphoid structures of healthy animals by a mechanical process which does not destroy its integrity.

Protonuclein *is indicated* in all forms of wasting diseases and asthenic conditions. It rapidly restores the vitality of all the tissues by stimulating and supporting assimilative nutrition. It is also indicated in all diseases due to toxic germs and in the treatment of Neoplasms, Ulcers, and all surface lesions, malignant or otherwise. It is also indicated as a prophylactic in exposure to contagion or infection.

Protonuclein is put up as follows: For Internal Use, **Protonuclein Tablets (three grains), in Bottles of 100, 500, and 1000; Protonuclein Powder, in Ounces and Half Pounds.** Protonuclein Special, for Local Application and Hypodermatic Use, **in Bottles holding ½ Ounce, 1 Ounce, and 8 Ounces.**

FOR SALE BY ALL DRUGGISTS

Samples, Clinical Reports, and other literature sent on request.

REED & CARNRICK, New York

Peptenzyme

A PERFECT DIGESTANT

Peptenzyme is a prompt and effective physiological remedy for all forms of Dyspepsia, Vomiting, Cholera Infantum, Malnutrition, etc., as it contains all the ferments furnished by nature for the perfect digestion of all kinds of food.

Peptenzyme also contains the *Osmogen* or *Embryo Ferments*, from which spring the matured or active ferments. By the appropriation of these undeveloped ferments the different organs of digestion are strengthened and stimulated to greater activity, so that they are afterwards able to supply the proper amount and quality of digestive secretions. The immediate effects noted are improvements in appetite as well as digestion.

Samples and literature mailed free to any physician, also our new edition of Diet Tables.

REED & CARNRICK, New York

It's a Wise Nurse

that aids the convalesence of patients by administering

ANHEUSER-BUSCH'S

Malt-Nutrine

TRADE MARK.

—the food drink. It is the palatable nutriment of the finest quality of malt and hops. Its strengthening and flesh-making properties make it invaluable to nursing mothers, consumptives and all sufferers from wasting diseases. Endorsed and prescribed by the medical profession generally.

To be had at all druggists' and grocers'.

Prepared by

ANHEUSER-BUSCH BREWING ASS'N,

St. Louis, U. S. A.

Send for our handsomely illustrated colored booklet and other reading matter.

Bound Volumes of the GAZETTE for 1893 and 1894 may be obtained by sending $2 for each volume to

THE GAZETTE PUBLISHING CO.,
1218 Broadway, N. Y. City.

Dr. Julius Fehr's
"COMPOUND TALCUM"
"BABY POWDER."

THE "HYGIENIC DERMAL POWDER FOR INFANTS" AND ADULTS.

Originally investigated and its therapeutic properties discovered in the year 1868 by DR. FEHR, and introduced to the Medical and the Pharmaceutical Professions in the year 1873.

Composition: Silicate of Magnesia with Carbolic and Salicylic Acids.

Properties: Antiseptic, Antizymotic and Disinfectant.

Useful as a **General Sprinkling Powder** with positive Hygienic, Prophylactic and Therapeutic Properties.

GOOD IN ALL AFFECTIONS OF THE SKIN.

Sold by the Drug Trade Generally.

Per box, plain, 25c.; perfumed, 50c. Per dozen, plain, $1.75; perfumed, $3.50.

The Manufacturer: **JULIUS FEHR, M.D.,** Ancient Pharmacist,
Established since 1859 in HOBOKEN, NEW JERSEY.

Only advertised in Medical and Pharmaceutical Prints.

"Does not depress the Heart."

A HIGH REPUTATION SUSTAINED

NO DRUG HABIT INDUCED — NO TOXIC EFFECT.

Antikamnia

OPPOSED TO PAIN.

ONE OF THE CERTAINTIES OF MEDICINE

Send your Professional Card for Brochure and Samples to

THE ANTIKAMNIA CHEMICAL CO.

St. Louis, Mo., U. S. A.

THE UNIVERSAL EXERCISER.

Do You Know That

If you are weak you can be made strong? If you are fat you can easily train down to graceful porportions? If you are thin you can develop your muscles and thus accumulate additional fatty tissue? Many chronic complaints can be permanently cured by physical training?

"Strength, health, manly and womanly beauty and vigor—the very foundation upon which are built all happiness, all success, and all that makes life productive of glorious **results—is attainable for all.**

McFadden's System of Physical Training.

A complete handbook; 128 magnificently illustrated pages, containing 60 half-tone photographs. Chapters on every subject relating to health and strength.

CONTENTS OF INSTRUCTION BOOK.

Nine Classical Poses of Prof. Bernard McFadden.

Subjects:—You're Not Too Old—Maybe You Haven't Time—Muscular Exercise an Internal Bath—The Greek Ideal—Mental Influence—For the Young Man—For the Young Woman—For the Middle-Aged Woman—For the Middle-Aged Man—Our Boys and Girls—As the Years Wane—The Perfect Human Form—41 Full-Page Photographs Showing Use of Exerciser—Athletics, or the Relation of Health to Strength—Women—Beauty—Diet—Exercise—Digestion—Breathing Exercises—The Air We Breathe—Restrictive Dress, Corsets, Belts, Etc.—Reducing Weight. Excessive Thinness—Sleep. Walking, Bicycling—Alcoholics. Bathing—Care of the teeth—Care of the Hair.

Special Instruction for Treating Diseased Conditions.

Digestive Disorders—Weak Lungs, General Debility—Deformities, Backache, Rheumatism.

This great work, the best ever published on physical training, is sold with the Exerciser, and can be obtained in no other way.

The Universal Exerciser.

(McFadden's Patent Pending.)

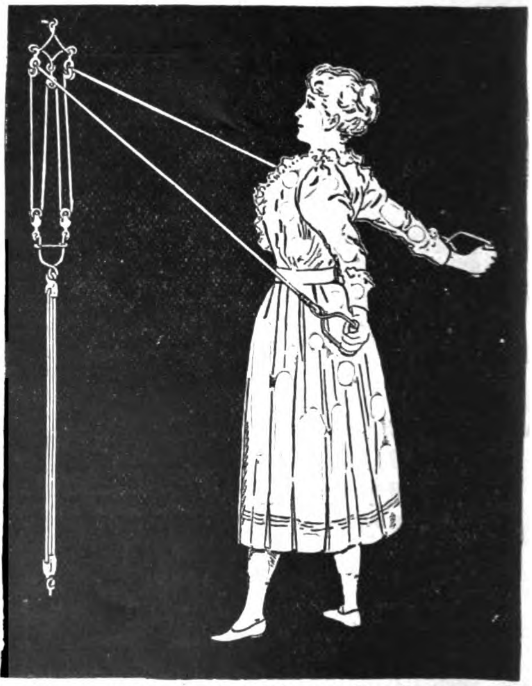
Absolutely the best Home Gymnasium ever made: simple, strong, complete, no weights, noiseless, reversible pull from floor or above. Can be quickly adjusted for the weakest child or the strongest man. Weighs but little more than a pound, can be carried in overcoat pocket, and put up in a minute. No bother with twisting. Never jerks. No rubber cord running over pulleys to wear out. Every conceivable motion—quick, slow, strong or weak. One machine will do for a family. Any desired strength. All with one machine.

Prices for Complete Outfits.

No. 1 Plain Wood Pulleys,	$2.00
No. 2 Wood Pulleys, nickel-plated shaft,	3.00
No. 3 Brass Pulleys, cone bearing, metal parts, nickel-plated,	4.00
No. 4 Metal parts, nickel-plated cone bearing cork handles very finely finished, silk-covered webbing,	5.00

All Exercisers guaranteed for two years.

Exercisers come in four degrees of strength—Children, Ladies', Strong, Extra Strong. If great variation of strength is desired for one machine, an extra rubber will be furnished for 50 cents; or 75 cents for silk covering.



No woman who cares for bright eyes, for a fine clear complexion, for the grace and suppleness that accompany a high degree of physical health, can afford to be without physical training.

ADDRESS ALL ORDERS TO

THE GAZETTE PUBLISHING COMPANY, 1218 Broadway, N. Y.

Willis P. King, M.D.

Ex-Vice-President Amer. Med. Ass'n

Has given to the Medical Profession the best book ever written for their leisure hours . . . .

Stories of a Country Doctor

IT'S 400 pages will hold your attention from beginning to end, and the stories you will never tire of repeating.

" The book beats the world."—*Southern Clinic*
" A sovereign remedy for the blues."—*The Country Doctor*
" Buy the book and throw physic to the dogs."—*Medical Mirror*
" One of the most sprightly books of the season."—*Kansas City Globe*
" Full of side-splitting fun from beginning to end."—*Kansas City Journal*
" As amusing reading as the writings of Mark Twain."—*Kan. City Med. Record*

Bound in Leather, ... $1.00
With Year's Subscription to GAZETTE. 2.00

1218 BROADWAY,
NEW YORK.

Correct Statements are Necessary, but not Sufficient.

Misstatement of scientific facts or mere unsupported assertions in Medical advertising cause bad impressions—doubt is created as to the reliability of the products offered, and thus sales are likely to be defeated.

On the other hand, Sales of MEDICAL, DIETETIC, or HYGIENIC preparations are not alone dependent on correct scientific description or merit. It is quite as important that Logical, Explanatory, and Convincing language should form a part of the advertisements of these articles; thus attention is arrested, interest secured, and successful sales are much more likely to follow.

Having made a study of this subject, we are prepared to originate or revise advertising matter for Manufacturing Chemists.

We also prepare pamphlets descriptive of MEDICAL, DIETETIC, or HYGIENIC preparations, which, if so desired, shall comprehend their history, chemical constituents, and therapeutic value, as proven by clinical test.

A chemist, a physician, and a practical business man constitute our organization, all of whom have had long experience in their several departments.

We respectfully invite consultations. Estimates for literary work will be given on request.

BARNES & SLAY,

1218 Broadway, New York.

AN UNUSUALLY
LARGE
INDUCEMENT

To Medical Students,

To Teachers and Nurses,

To all whom it may concern.

THE DIETETIC AND HYGIENIC GAZETTE has a very wide circulation. It should and doubtless would have the largest subscription list of any magazine in the country were its true worth universally known.

Any one who will lend a hand in securing subscribers to the GAZETTE will be paid liberally in cash.

For clubs of five, ten, or twenty, the largest compensation will be paid.

Subscription, $1.50 per annum.

Send postal card for terms, premium, etc.

THE GAZETTE PUBLISHING CO.,
1218 Broadway, New York City.

WHAT IS TERRALINE?

A Purified Petroleum for internal use—a substitute for Cod Liver Oil and Emulsions--odorless, tasteless, antiseptic, and does not cause nausea.

For the treatment of pulmonary, bronchial, catarrhal and throat diseases, it stands practically without a rival.

..1890.. ..1896..

Beginning the sixth year of its existence, TERRALINE proudly numbers as its friends the best element of the medical profession from Maine to Mexico, who continue to prescribe it with that certainty of success that comes from absolute faith in its curative properties.

TERRALINE can be found at all drug stores and can be prescribed as follows:

℞ **Terraline..............................℥ xii.**

Signa: Two teaspoonfulls three or four times daily in wine or other vehicle.

THE TERRALINE COMPANY,
1316 L Street, N. W., WASHINGTON, D. C.

TRIFLES.

TRIFLES preserve health and trifles cause disease. One great stumbling-block in the onward march of hygiene is the idea, erroneously held by many, that a hygienic life necessarily implies a life of great self-denial and self-sacrifice; hence, thoughtless humanity instinctively recoils against any suggestions of a hygienic nature. Until the subject is rightly understood, there is, we admit, apparently some foundation for this idea, which is strengthened by the way in which some sanitarians preach, and try to enforce the doctrines of hygiene.

Life is a matter of habit to a much greater extent than most of us realize, and if we only take a little trouble to cultivate habits that are healthful rather than those conducive to disease, a hygienic life becomes easy to us; it becomes habitual, and we are not conscious of any sacrifice of comfort or desire; on the contrary, we are conscious only of the pleasure and satisfaction possible only to the healthy individual. -*Annals of Hygiene.*

HYGIENE OF THE EYE.

WHEN the eyes ache close them for five minutes.

When they burn bathe them in water as hot as can be borne, with a dash of witch hazel in it.

After weeping bathe them in rose-water and lay a towel wet in rose-water over them for five minutes.

When they are bloodshot sleep more.

When the whites are yellow and the pupils dull, consult your doctor about your diet.—*Medical Brief.*

* * *

A TEST FOR HUMIDITY IN ROOMS.

IT IS not easy to determine the relative dampness of a room by inspection. A surer method is to expose a known weight—say 1,000 grains—of dry, fresh lime in a shallow dish, and close up the room perfectly tight for twenty-four hours. If at the end of that time the lime has absorbed over 1 per cent. of moisture, the room should be considered sufficiently damp to be unhealthy.—*Annals of Hygiene.*

FROM **Sydenham** DOWN

all famous physicians have had some specially good prescriptions. Dr. John H. King has embodied these in a book of 346 pages, entitled ∴ ∴ ∴

King's Medical Prescriptions

It is a work of inestimable value. It will be your constant work of reference; highly recommended by the medical press; printed on superfine paper; large type; beautifully bound in cloth; octavo 346 pages. Second Edition. Price, postpaid, $1.00 ∴

With one year's subscription to the GAZETTE, $2.00.

GAZETTE PUBLISHING CO., 1218 Broadway.

TRUTH BEARS REPETITION.

ARSENAURO

The Ideal Blood Cleanser.

ARSENAURO

The Ideal Blood Cleanser.

CHAS. ROOME PARMELE CO., 98 WILLIAM ST., N. Y.

CHIONIA—

THE HEPATIC STIMULANT

Is prepared from ***Chionanthus Virginica,*** for physicians' prescriptions, and has been proven ***the remedy*** for ***Biliousness, Jaundice, Dyspepsia, Constipation,*** and all diseases caused by ***Hepatic Torpor.***

Its action is that of an hepatic stimulant, and not that of a cathartic. It does not purge, *per se*, but under its use the Liver and Bowels gradually resume their normal functions.

Dose—One to two fluid drachms, three times a day.

PEACOCK'S BROMIDES,

THE IDEAL SEDATIVE

Is prepared exclusively for physicians' prescriptions, each fluid drachm representing 15 grains of combined ***chemically pure*** Bromides of Potassium, Sodium, Calcium, Ammonium and Lithium. It is indicated in ***Uterine Congestion, Headache, Epilepsy,*** and all ***Congestive, Convulsive and Reflex Neuroses.***

It is ***absolutely uniform*** in purity and therapeutic power, and can always be relied upon to produce clinical results which can not possibly be obtained from the use of commercial bromide substitutes.

Dose—One to two fluid drachms in water, three times per day.

A full size half-pound bottle of each FREE to any physician who will pay express charges.

PEACOCK CHEMICAL COMPANY,
ST. LOUIS, MO.

SENG,

THE DIGESTIVE SECERNENT.

ACTIVE CONSTITUENTS OF PANAX SCHINSENG (MANCHURIA) IN AN AROMATIC ESSENCE.

For Indigestion and Malnutrition.

Specially indicated in Phthisis and all Wasting Diseases.

Dose—One or more teaspoonfuls three times a day. For babies, ten to fifteen drops during each feeding.

CACTINA PILLETS.

INDICATED IN

ABNORMAL HEART ACTION.

GIVEN WITH ANTIPYRETICS TO PREVENT CARDIAC DEPRESSION.

☞Each pillet represents one one-hundredth of a grain of Cactina—the active proximate principle of Cactus Mexicana.

Dose—One Pillet every hour, or less often, as indicated.

Samples sent to any Physician who will pay Express Charges.

SULTAN DRUG CO., St. Louis and London.

FROM NATURE'S LABORATORY.

Ripley Brom-Lithia Water

contains 300 times as much LITHIUM measure for measure, as any other water on earth *** This LITHIUM is found unchanged in the TABLETS, hence their phenomenal action on the

KIDNEYS AND LIVER,

In CYSTITIS,
NEPHRITIS,
ENURESIS,
PYELITIS,
GRAVEL,

MADE OF SALTS OBTAINED BY EVAPORATING THE FAMOUS **RIPLEY BROM-LITHIA WATER** IN VACUO, AT THE SPRING
RIPLEY, O.

RHEUMATISM, GOUT, DIABETES,
BRIGHT'S and LIVER CIRRHOSIS,

These Tablets are unequaled. Their action is prompt and positive. Enough for two weeks treatment costs only ONE DOLLAR, by mail. Money back if not satisfied with results. Analysis and Literature free to Physicians only.

THE RIPLEY COMPANY,
159 West 23d St. - - - New York.

THE TRUE TEST.

"As long as the practice of medicine is in its inexact stage, so long will the rise and fall of medicinal substances be recorded. The true test of their value lies in the number of years they can withstand the practical criticism of an exacting profession. The universal use of 'Platt's Chlorides' after an existence of so many years in a field hotly contested by able competitors is the best evidence of its worth as a disinfectant and deodorizer."

Yours very truly,
Andrew P. Biddle, M.D.,
Lecturer on Dermatology and Syphilology,
Physician to Children's Free Hospital,
Detroit.

"I have used 'Platt's Chlorides' for twelve years."

Alfred C. Cotton, M.D.,
Professor of Diseases of Children,
Rush Medical College.

Wampole's Perfected and Tasteless Preparation of

COD LIVER OIL

(OL. MORRH. COMP. WAMPOLE).

Contains a solution of the combined alkaloidal and other active medicinal principles, obtainable from one-fourth its volume of pure Cod Liver Oil, the oily or fatty portion being entirely eliminated. These principles are extracted from the oil while it is yet contained in the fresh Cod Livers, and combined with Extract of Malt, Fluid Extract Wild Cherry Bark, and Syrup of Hypophosphites Compound (containing Lime, Soda, Potassium, Iron, Manganese, Quinine, and Strychnia).

COPY OF ANALYSIS.

Laboratory of Robert G. Eccles, M.D., Brooklyn, N. Y., April 29, 1896.

Messrs. Henry K. Wampole & Co., 441 Green St., Philadelphia, Pa.

Gentlemen: A careful chemical examination of fresh Cod Liver Oil as found in fresh Cod Livers which I obtained direct from the Cod Fish, reveals beyond question the presence of definite alkaloids and other active medicinal principles therein.

An equally careful examination of your Cod Liver Oil Extract, used in the manufacture of your preparation of Cod Liver Oil, demonstrated beyond a peradventure the presence of *these same alkaloids* and the other medicinal substances extracted by me directly from the oil I found in the Cod Livers.

Finally another equally careful analysis of your finished product, "Wampole's Perfected and Tasteless Preparation of Cod Liver Oil," shows in an unquestionable manner the presence therein of *these same alkaloids and medicinal substances* from Cod Liver Oil, together with various hypophosphites, quinine, strychnine, wild cherry, etc.

An examination in detail of your process of manufacture and of the special machinery and apparatus used by you in extracting the combined alkaloidal and other active medicinal principles of Cod Liver Oil convinced me of their efficiency for just such work, and showed the care and pains taken by you to get a pure and useful product.

Very truly yours, ROBERT G. ECCLES.

The clinical results obtained by the use of Wampole's Preparation will prove its efficacy in diseases and conditions where Cod Liver Oil is indicated, in addition to its valuable tonic and alterative effect, due to its other medicinal ingredients.

Circular matter and samples for trial promptly and cheerfully furnished upon application, free of charge. Prepared solely by

HENRY K. WAMPOLE & CO., MANUFACTURING PHARMACISTS, **441 Green St., Philadelphia, Pa.**

Autumnal Fevers

now prevail. The liberal use of "Platt's Chlorides" for disinfecting the discharges, deodorizing and refreshing the disease-laden atmosphere of the sick-room, is recommended by the most eminent physicians.

For disinfecting dejecta,
dilute with 4 parts water.
For sprinkling floors,
dilute with 10 parts water.
For moistening towels or cloths,
dilute with 10 parts water.

"Platt's Chlorides" is an odorless, colorless liquid; powerful, safe and economical sold in quarts bottles only by druggists everywhere.

Prepared only by

HENRY B. PLATT, PLATT ST., NEW YORK.

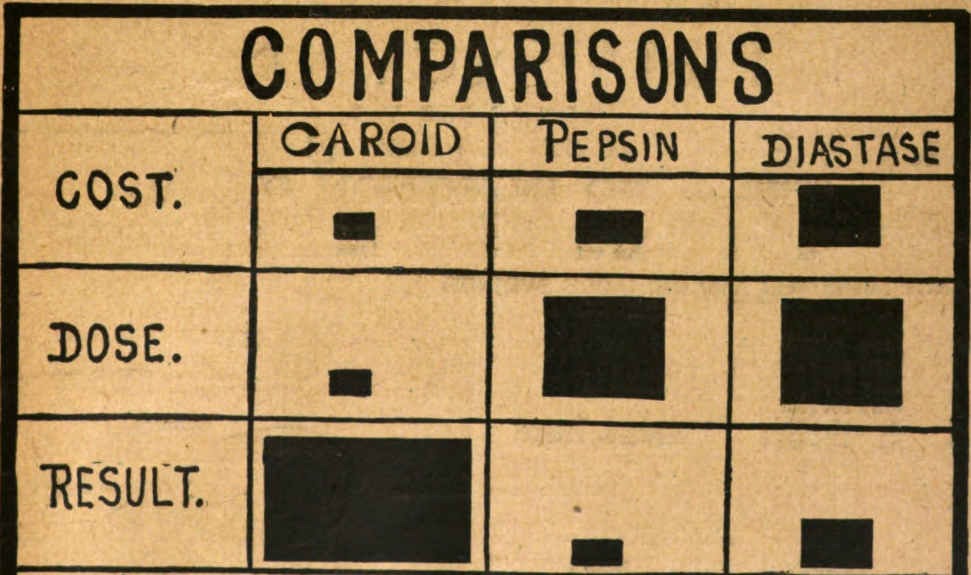
A TOWEL MOISTENED WITH Platt's Chlorides, FREQUENTLY WAFTED ABOUT THE SICK ROOM IS THE MOST THOROUGH AND PRACTICAL METHOD OF PURIFYING THE AIR

An Odorless Liquid Indorsed by 23,000 Physicians.

Destroys Disease Germs.

The Trained Nurse Knows
Platt's Chlorides.
The True Disinfectant.

COMPARISONS



CAROID WILL PROMPTLY DIGEST ANY FOOD EATEN BY MAN.

IS A HIGHLY CONCENTRATED EXTRACT OF CARICA PAPAYA.

CHAS. ROOME PARMELE CO.,
36 PLATT STREET,
NEW YORK.

Kutnow's Improved Effervescent Powder.

TRADE MARK

Hirschensprung or Deer Leap

THE ONLY PLEASANT TASTING SALINE CATHARTIC IN THE MARKET. . . . .

A RELIABLE AND EFFECTIVE REMEDY FOR

Indigestion, Constipation, Dyspepsia, Gout, Diabetes, Kidney and Liver Derangements.

Unparalleled for INFANTILE CONSTIPATION and an Excellent Cathartic for Pregnant Women.

Largely prescribed by the Medical Profession of both hemispheres, highly recommended by Prof. Lawson Tait, and indorsed by the most eminent medical journals, such as the *Lancet, British Medical Journal,* and others.

KUTNOW BROS., - 52-54 Lafayette Place, New York.

SEND FOR SAMPLE. CUT THIS OUT.

KUTNOW BROS., 52-54 Lafayette Place, New York.

Please send free of charge trial bottle of Kutnow's Improved Effervescent Powder.

Name..*M.D.*

Street and No...............................*City*..............................*State*..................

PHYSICIANS

RECOMMEND THE

"ALPHA" CONTINUOUS FLOW SYRINGES

Because they give NO INJECTION OF AIR!

The ALPHA and the OMEGA Syringes positively prevent the painful and dangerous injection of air, so common with the old style of intermittent Syringes.

ONLY IMPROVED AND RELIABLE SYRINGE OF THE AGE.

Patented June 9, 1885
" April 13, 1886
" May 11, 1886
" May 18, 1886
" Nov. 16, 1886
" Dec. 21, 1886
" Jan. 4, 1887
" Jan. 25, 1887
" May 10, 1887

Also Patented in England, France, Germany and Canada.

BRIEF CLAIMS FOR THE

ALPHA "E" SYRINGE.

Continuous flow, either gentle or strong.
Positively no injection of air.
No fecal matter can be drawn back into the tubes.
Pure Hard Rubber Pipes, the best non-conductor.
All Valves secured and cannot be lost.
No Screw Threads on this Syringe, therefore it cannot leak.
Noiseless and Non-corrosive Sinker.
Easy to operate with thumb and finger.
The cleanest and most durable for family use.
Efficiency and quality of material guaranteed.
SEND ADDRESS FOR ILLUSTRATED DESCRIPTION.

CUT THIS OUT.

This **PHYSICIAN'S COUPON** Enclosed with $1.10 will entitle a Physician to one of our ALPHA "E" Continuous Flow Syringes, Postage paid.

PARKER, STEARNS & SUTTON, Manufacturers,
228 & 229 South St., New York.